2013-03

Compilation of abstracts, March 2013

Monterey, California; Naval Postgraduate School

NPS-04-13-002

COMPILATION OF ABSTRACTS

Unrestricted Theses, Dissertations, and Final Projects

NPS Class of March 2013

Office of the Vice President and Dean of Research
NAVAL POSTGRADUATE SCHOOL
Monterey, California • www.nps.edu

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

PREFACE

This publication, *Compilation of Abstracts*, contains abstracts of unrestricted theses, capstone project reports, and dissertations submitted for the master of arts, master of business administration, master of science, and doctor of philosophy degrees for the Naval Postgraduate School's March 2013 graduating class.

This compilation is published to acquaint those interested in the fields represented with the nature and substance of Naval Postgraduate School student research, which covers a wide range of defense-related topics. An online copy of this and previous editions can be found at http://www.nps.edu/Research/MoreThesisAbst.html. Calhoun, the institutional archive of NPS, provides a convenient way to search the content of unrestricted theses. Access Calhoun at http://calhoun.nps.edu/public/handle/10945/6. Restricted theses are available for viewing on the NPS SIPRNet and through the Defense Technical Information Center at http://www.dtic.mil/dtic/customer/.

Guidelines for obtaining printed copies of *Compilation of Abstracts* are outlined on the last page of this volume.

Additional Information on NPS Research and Academic Programs

Summary of Research, an annual compilation of research projects and publications, is also available online at http://www.nps.edu/Research/SummaryRes.html. "Research News," a monthly newsletter highlighting some of the newest developments in NPS research, can be found at http://www.nps.edu/Research/Newsletters.html.

For other inquiries about student and faculty research at NPS, please contact the Vice President and Dean of Research, Jeffrey Paduan:

Naval Postgraduate School
Monterey, CA 93943-5138
Phone: (831) 656-2852
Fax: (831) 656-2038
Email: research@nps.edu

For details on degree programs at NPS, please contact the director of admissions at (831) 656-3093 or grad-ed@nps.edu. The NPS academic catalog is available at http://www.nps.edu/Academics/GeneralCatalog/Layout.html. The admissions website is at http://www.nps.edu/Academics/Admissions/Index.html.

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

ADVANCED DEGREES

Doctor of Philosophy

MASTER OF ARTS

Master of Arts in Security Studies

MASTER OF SCIENCE

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

INTRODUCTION

The Naval Postgraduate School is pleased to present the thesis, capstone-project report, and dissertation abstracts (hereafter thesis or terminal project) for unclassified research completed in March 2013 by the graduating class.

MISSION

The Naval Postgraduate School (NPS) was established to serve the advanced educational needs of the Navy. The broad responsibility of NPS is reflected in its stated mission:

Increase the combat effectiveness of U.S. and allied armed forces and enhance the security of the United States of America through advanced education and research programs focused on the technical, analytical, and managerial tools needed to confront defense-related challenges of the future.

To fulfill its mission, the Naval Postgraduate School strives to advance innovation in the Navy and prepare officers for introducing and employing future technologies. The research program at NPS supports the mission of graduate education. Research at NPS

- advances knowledge in a wide range of disciplines relevant to DON/DOD;
- maintains upper-division course content and programs at the cutting edge;
- provides the opportunity for students to demonstrate independent graduate-level scholarship in their areas of study;
- challenges students with creative problem solving experiences on DOD-relevant issues;
- solves warfare problems; and
- attracts and retains quality faculty with state-of-the-art expertise.

To meet its educational requirements, the Navy has developed a unique academic institution at NPS and via distance learning (DL) through specially tailored academic programs and a distinctive educational experience tying academic disciplines to naval and joint warfighting applications. NPS has aligned its education and research programs to achieve three major goals:

1. nationally recognized academic programs that support the operations of the Navy and Marine Corps, our sister services, and our allies;
2. research programs that focus on the integration of education and research in support of current and emerging national security technologies and operations; and
3. executive and continuing education programs that support sustained intellectual innovation and growth throughout an officer's career.

ACADEMIC PROGRAMS

School of International Graduate Studies (SIGS)

The unique programs and faculty expertise within SIGS seek to identify and address current and emerging security challenges and strengthen multilateral and bilateral defense cooperation between the United States and other nations. Areas of expertise range from nuclear nonproliferation to counterterrorism; from the history of war to emerging biological and cyber threats; and from the security aspects of political economy to international law.

- Civil–Military Relations
- Combating Terrorism Strategy and Policy
- Defense Decision Making and Planning
- Homeland Security and Defense
- Security Studies
- Stabilization and Reconstruction
- National Security and Intelligence, Regional Studies:
  - Middle East, South Asia, Sub-Saharan Africa
  - Far East, Southeast Asia, the Pacific
  - Europe and Eurasia
  - Western Hemisphere

Graduate School of Business and Public Policy (GSBPP)

GSBPP reflects the management side of national defense in support of operational requirements, with programs open to the U.S. uniformed services, DOD employees and contractors, federal employees, and international military and government employees. An integrated civilian and military faculty focuses on defense organizations, system applications, and instruction supported by extensive defense-oriented research.

- Acquisition and Contract Management
- Advanced Acquisition Program
- Contract Management (DL)
- Defense Business Management
- Defense Systems Analysis
- Defense Systems Management
- Executive MBA (DL)
- Financial Management
- Information Systems Management
- Material Logistics Support
- Manpower Systems Analysis
- Program Management (DL)
- Supply-Chain Management
- Systems Acquisition Management
- Transportation Management

Graduate School of Engineering and Applied Sciences (GSEAS)

GSEAS provides advanced education in engineering and applied sciences while developing technological advances with strict application to DOD needs, thus setting it apart from civilian graduate schools of engineering. It is focused on preparing the next generation of U.S. and international leaders, military and civilian alike, for the uncertainties and challenges of a rapidly changing technological world.

- Applied Mathematics
- Combat Systems Sciences and Technology
- Electronic Systems Engineering (residential and DL)
- Mechanical Engineering for Nuclear-trained Officers (DL)
- Meteorology and Oceanography
- Meteorology
- Naval/Mechanical Engineering
- Oceanography
- Operational Oceanography
- Reactors–Mechanical/Electrical Engineering (DL)
- Space Systems Engineering
- Space Systems Operations (residential and DL)
- Systems Engineering (residential and DL)
- Systems Engineering Management (DL)
- Undersea Warfare
- Underwater Acoustic Systems (DL)

Graduate School of Operational and Information Sciences (GSOIS)

GSOIS delivers graduate-level education and conducts cutting-edge research in four non-traditional knowledge domains responsive to U.S. military needs: information science and technology, military computer science, military operations analysis and research, and special operations and related defense analysis.

- Applied Cyber Operations
- Computer Science (residential and DL)
- Computing Technology (DL)
- Cyber Systems and Operations
- Cost Estimating and Analysis (DL)
- Electronic Warfare Systems (International)
- Human Systems Integration
- Identity Management and Cyber Security (residential and DL)
- Information Sciences
- Information Systems and Operations
- Information Systems and Technology
- Information Warfare
- Joint C4I Systems
- Joint Information Operations
- Joint Operational Logistics
- Modeling, Virtual Environments, and Simu lation
- Operations Analysis
- Remote Sensing
- Software Engineering (residential and DL)
- Special Operations
- Systems Analysis (DL)

Office of the Provost

The Office of the Provost provides oversight to a specialized degree program that leads to a master of science in systems engineering analysis. Students benefit from cross-disciplinary course offerings and research opportunities found in GSEAS systems engineering and GSOIS systems and operational analysis curricula.

- Systems Engineering Analysis

STUDENT POPULATION

The student body consists of U.S. officers from all branches of the uniformed services, civilian employees of the federal government, and international military officers and government civilians. The student population distribution for March 2013 is shown in Figure 1.

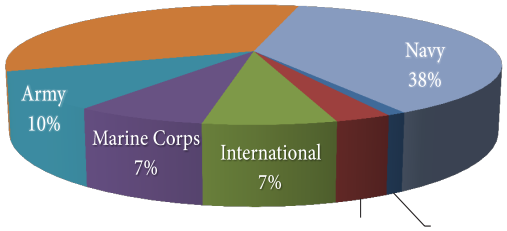


Figure 1: Total enrollment by student type for winter 2013 (2,967 total). Source: NPS Academic Affairs Quarterly Enrollment Report, Winter 2013.

**Army Reserve, Army Reserve National Guard, Coast Guard, and National Oceanographic and Aeronautics Administration*

STUDENT RESEARCH

Independent scholarly work in the form of a dissertation (PhD), thesis (Master's/Engineer), or capstone project is required for most academic programs. Student research projects address issues ranging from the current needs of the fleet and joint forces to the science and technology required to sustain long-term superiority of the Navy and DOD. Guided by faculty advisors, NPS students represent a vital resource within the DOD for addressing war-fighting problems and maintaining cutting-edge expertise, particularly in a time when technology and information operations are changing rapidly. Naval Postgraduate School alumni think innovatively and possess the knowledge and skills to apply nascent technologies in the commercial and military sectors. Their firsthand grasp of operations, when combined with challenging projects that require them to apply their focused graduate coursework, is one of the most effective elements in solving fleet, joint-force, and regional problems. NPS graduate education encourages a lifelong capacity for applying basic principles and creative solutions to complex problems. NPS is also unique in its ability to conduct classified research. Classified theses are available on the NPS SIPRNet.

DEGREES OFFERED

Curricula meet defense requirements within the traditional degree framework through residential or distance-learning status. All curricula lead to a master of science or art or a master of business administration; additional study may yield an engineer or doctoral degree. Below is a listing of degrees offered at the Naval Postgraduate School.

Doctor of Philosophy

- Applied Mathematics
- Applied Physics
- Astronautical Engineering
- Computer Science
- Electrical Engineering
- Engineering Acoustics
- Information Sciences
- Mechanical Engineering
- Meteorology
- Modeling, Virtual Environments, and Simulation
- Operations Research
- Physical Oceanography
- Physics
- Security Studies
- Software Engineering
- Systems Engineering
- Systems Engineering Analysis

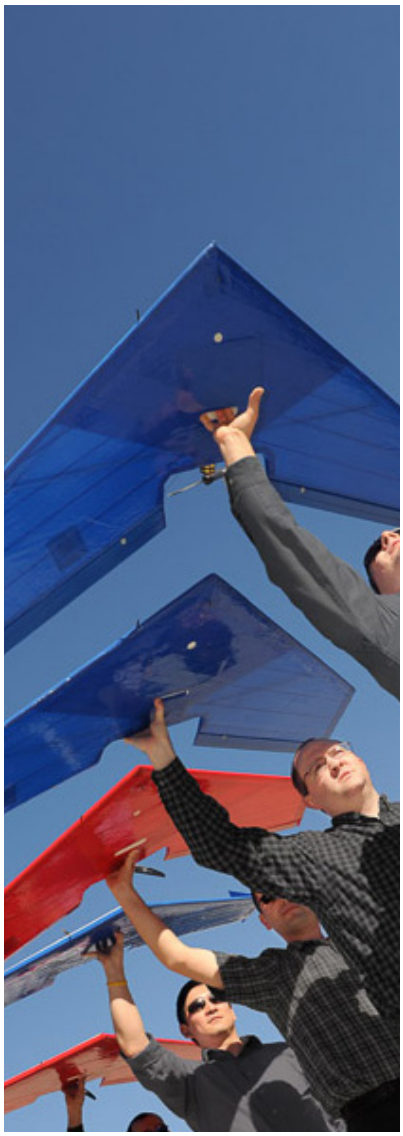
Engineer

- Astronautical
- Electrical
- Mechanical

Master of Arts

- Identity Management and Cyber Security
- Security Studies

Master of Business Administration



Master of Science

- Applied Cyber Operations
- Applied Mathematics
- Applied Physics
- Applied Science
- Astronautical Engineering
- Combat Systems Technology
- Computer Engineering
- Computer Science
- Computing Technology
- Contract Management
- Cyber Systems and Operations
- Defense Analysis
- Electrical Engineering
- Electronic Warfare Systems Engineering
- Engineering Acoustics
- Engineering Science
- Engineering Systems
- Human Systems Integration
- Information Operations
- Information Systems and Operations
- Information Technology Management
- Information Warfare Systems Engineering
- Management
- Mechanical Engineering
- Meteorology
- Meteorology and Physical Oceanography
- Modeling, Virtual Environments, and Simulation
- Operations Research
- Physical Oceanography
- Physics
- Product Development
- Program Management
- Remote-Sensing Intelligence
- Software Engineering
- Space Systems Operations
- Systems Analysis
- Systems Engineering
- Systems Engineering Analysis
- Systems Engineering Management
- Systems Technology

MARCH 2013 DEGREES CONFERRED

The March 2013 graduating class produced 144 unrestricted theses, dissertations, capstones, and final project reports as part of the graduation requirement. Figure 2 indicates the distribution of degrees awarded by academic program..

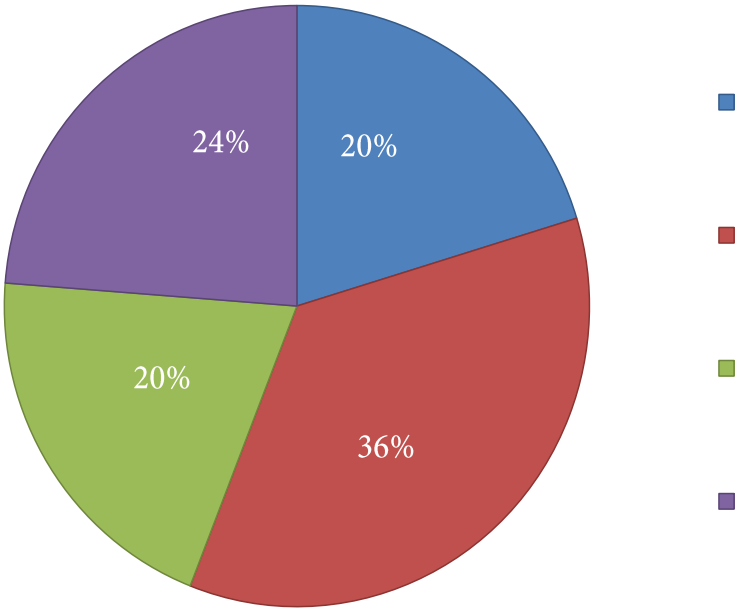


Figure 2. Distribution of degrees conferred by academic program, March 2013 (unrestricted theses)

ACADEMIC AWARDS ANNOUNCED MARCH 2013

The following listing provides recognition to those students selected by NPS faculty or military associations for superior academic achievement. Quite a few departments honor graduating students for the quality and contributions made by their theses, dissertations, or capstone reports.

Campus-wide Awards

- Monterey Council Navy League Award for Highest Academic Achievement: LT Adrian Laney, USN
- Association of the United States Army, General Joseph W. Stilwell Chapter, Award for Outstanding Army Student: MAJ Matthew R. Myer, USA
- Air Force Association Award for Outstanding U.S. Air Force Student: Capt Nolan S. Semrau, USAF
- Naval Postgraduate School Outstanding Academic Achievement Award for Department of Defense Student: Mr. Richard Caccese, Department of the Navy
- Naval Postgraduate School Outstanding Academic Achievement Award for International Students: Mr. Yong Hui "Ronny" Tan, Republic of Singapore, Ministry of Defence
- Naval Postgraduate School Superior Service Award: Maj David J. Coté, USMC
- Marine Corps Association Superior Service Award for Outstanding U.S. Marine Student: Maj David J. Coté, USMC
- The Outstanding United States Air Force Graduate Award, Department of National Security Affairs: Capt Joseph A. Bincarousky, USAF and Maj Jennifer L. Whetstone, USAF
- Monterey Kiwanis Club Outstanding International Student Award: WG CDR Srinivas Ganapathiraju, Indian Air Force

Graduate School of Business and Public Policy (GSBPP)

- The Louis D. Liskin Award for Excellence in Business and Public Policy: Mr. Yong Hui "Ronny" Tan, Republic of Singapore, Ministry of Defence, and Ms. Yun Fang "June" Liew, Republic of Singapore, Ministry of Defence
- The Graduate School of Business and Public Policy Faculty Outstanding International Student Award: Mr. Yong Hui "Ronny" Tan, Republic of Singapore, Ministry of Defence
- RADM Donald R. Eaton Logistics Award for Outstanding Achievement: LCDR Andres V. Pico, USN
- Rear Admiral Thomas R. McClellan Award for Academic Excellence in the Graduate School of Business and Public Policy: Capt David W. Forbell, USMC
- Naval Supply Systems Command Award for Academic Excellence in Management: LCDR Kevin McNulty, USN
- Department of the Navy Award for Academic Excellence in Financial Management: LT Clarence D. Washington, USN
- Conrad Scholar Award for Distinguished Academic Achievement in Financial Management: LCDR Kevin McNulty, USN; LT Chad Kalocinski, USN, and CAPT Adam Chu, USMC
- The Army Acquisition Corps Award for Scholastic Achievement: CPT Jonathan Judy, USA
- CDR Philip A. Murphy-Sweet Memorial Award for Excellence in Acquisition: LCDR John P. Hagan, USN
- The Assistant Secretary of the Air Force (Acquisition) Award for Academic Excellence: Capt Jennifer Mapp, USAF

Graduate School of Engineering and Applied Sciences (GSEAS)

- Astronaut Michael J. Smith, CAPT, USN, and Astronaut William C, McCool, CDR, USN Astronautics Award: LT Luke Parobek, USN
- Space and Naval Warfare Systems Command Award in Electronic Systems Engineering: Maj Jason R. Jones, USMC
- Naval Sea Systems Command Award in Naval/Mechanical Engineering: LT William Joel Marple, USN
- The Space Systems Engineering Award for Academic Excellence: LCDR Matthew DeMartino, USN

Graduate School of Operational and Information Sciences (GSOIS)

- John McReynolds Wozencraft Electrical and Computer Engineering Academic Honor Award: LT Konstantinos Fotis, Hellenic Navy
- Rear Admiral Grace Murray Hopper Computer Science Award: Mr. Garrett B. McGrath, Federal Cyber Corps
- Rear Admiral Grace Murray Hopper Information Technology Management Award: LCDR R. Alexander Madden, USN
- The Naval Sea Systems Command Award for Excellence in Combat Systems: Capt Filipe A. Peerally, USMC
- The Pat Tillman Leadership Award: Maj Keith L. Carter, USA and MSG Garric M. Banfield, USA
- Wayne E. Meyer Award for Outstanding Student in Systems Engineering (Integrated Projects): Brigitte T. Kwinn

School of International Graduate Studies (SIGS)

- The Louis D. Liskin Award for Excellence in Regional Security Studies: LT Mate W. Aerandir, USN
- The International Student Award for Excellence in Regional or Security Studies: Lt Col Valdas Dambrauskas, Lithuanian Air Force
- The Hans Jones Award for Excellence in Thesis Research in Special Operations and Irregular Warfare or Security, Stabilization, Transition and Reconstruction: MAJ Ethan Miles, USA
- The Curtis H. "Butch" Straub Achievement Award: Assistant Chief John Bennett, Tampa Police Department, Florida
- The Philip Zimbardo Award: Mr. Alan Moore, U.S. Immigration and Customs Enforcement; Detroit, Michigan

Institutes and Centers Awards

- Naval Intelligence Foundation, Admiral Bobby Ray Inman Award for Outstanding Performance in the Field of Intelligence: LCDR Scott Roper, USN
- The Surface Navy Association's Award for Excellence in Surface Warfare Research: LT Linda Dams, USN and LT Christina Appleman, USN

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

ADVANCED DEGREES

Doctor of Philosophy

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

DOCTOR OF PHILOSOPHY

THE EFFECT OF MILD MOTION SICKNESS AND SOPITE SYNDROME ON MULTITASKING COGNITIVE PERFORMANCE

Panagiotis Matsangas–Lieutenant Commander, Hellenic Navy
B.S., Hellenic Naval Academy, 1992
M.S., Naval Postgraduate School, June 2004
Doctor of Philosophy in Modeling, Virtual Environments and Simulation (MOVES), March 2013
Advisor: Michael E. McCauley, MOVES

This research investigated the effects of mild motion sickness and sopite syndrome on multitasking cognitive performance. Fifty-one healthy individuals (45 males, 6 females) were recruited in three data collection periods from the pool of Naval Postgraduate School (NPS) students, faculty, and staff. Participants from the 2010 and 2011 data collection periods were randomly assigned to one of two groups, M-NM (n=20, motion in the first session, no motion in the second) or NM-M (n=19, no motion in the first session, motion in the second). All participants (n=12) from the 2012 data collection were assigned to group "NM-NM" and did not experience motion in either session.

On average, reported severity of motion sickness was mild. In this study, cognitive multitasking performance deteriorated with the development of mild motion sickness; however, this result was confounded by an order effect. Performance differences between symptomatic and asymptomatic participants in composite (9.43%), memory (31.7%), and arithmetic (14.7%) task scores were significant only in the second experimental session. Furthermore, results suggest that performance retention between sessions in a novel cognitive multitasking environment is not affected by mild motion sickness. We postulate that the differential effect of session on the association between symptomatology and multitasking performance may be related to the attentional resources allocated to performing the multi-task. Results suggest an inverse relationship between motion sickness effects on performance and the cognitive effort focused on performing a task. Lastly, a revised definition of sopite syndrome is proposed, addressing the limitations of earlier approaches.

KEYWORDS: motion sickness, sopite syndrome, multitasking cognitive performance

LEARNING AND PREDICTION OF RELATIONAL TIME SERIES

Kian-Moh Terence Tan–Civilian, Singapore DSO National Laboratories
Bachelor of Science in Computing and Information Systems, University of London, 2000
Master of Science in Modeling Virtual Environments and Simulation–December 2007
Master of Science in Defense Technology and Systems, National University of Singapore, July 2008
Doctor of Philosophy in Modeling, Virtual Environments and Simulation (MOVES), March 2013
Advisor: Christian Darken, Department of Computer Science

Prediction of events is fundamental to both human and artificial agents. The main problem with previous prediction techniques is that they cannot predict events that have never been experienced before. This dissertation addresses the problem of predicting such novelty by developing algorithms and computational models inspired from recent cognitive science theories: conceptual blending theory and event segmentation theory. We were able to show that prediction accuracy for event or state prediction can be significantly improved using these methods.

The main contribution of this dissertation is a new class of prediction techniques inspired by conceptual

blending that improves prediction accuracy overall and has the ability to predict even events that have never been experienced before. We also show that event segmentation theory, when integrated with these techniques, results in greater computational efficiency. We implemented the new prediction techniques, and more traditional alternatives such as Markov and Bayesian techniques, and compared their prediction accuracy quantitatively for three domains: a role playing game, intrusion-system alerts, and event prediction of maritime paths in a discrete-event simulator. Other contributions include two new unification algorithms that improve over a naïve one and an exploration of ways to maintain a minimum size knowledgebase without affecting prediction accuracy.

KEYWORDS: relational time series, learning, prediction, Bayesian, Markov, analogical reasoning, conceptual blending, event segmentation

OUTSOURCING HUMAN SECURITY: THE PROS AND CONS OF PRIVATE SECURITY COMPANIES IN PEACEKEEPING

Daniel G. Straub–Commander, United States Navy
A.S., City University of Seattle, 1991
A.A., Mt. San Antonio College, 1992
B.A., Pennsylvania State University, 1996
M.A., Boston University, 2003
Doctor of Philosophy in Security Studies, March 2013
Dissertation Supervisor: Dr. Thomas Bruneau, Professor of National Security Affairs

The United Nations is an international organization that acts in world affairs with the proclaimed aim of ending "the scourge of war" and promoting world peace. The UN often uses peacekeeping to further this goal. This dissertation considers the potential for private security companies (PSCs) to make a contribution to peacekeeping missions. PSCs claim to offer a flexible capability that can be used to assist organizations and states toward improvements in human security. PSCs offer services ranging in scope from protecting diplomats to providing security for major corporations, NGOs, and the UN. They also claim that their services can be performed better, cheaper, and faster than states or organizations like the UN. For example, supporters of PSCs claim that they could have prevented atrocities such as occurred in Rwanda, Srebrenica, and Congo. Opponents of the increased use of PSCs raise a host of concerns, including cost, morality, legitimacy, loyalty, fraud, accountability, and political will. In an era when states often lack critical capabilities to protect the peace or prevent war, PSCs may offer a temporary solution to fill these gaps. What are the advantages and disadvantages to the use of PSCs for international peacekeeping? The analysis in this dissertation focuses on the ability of PSCs to perform not just specific tasks, but on their ability to conduct peacekeeping with legitimacy, accountability, and impartiality, while protecting human security. Since ending the scourge of war is the most important goal of the UN, then human security must be the guiding principle upon which all structures of integration, communication, and interrelationships in peacekeeping are based. Using the concept of human security as a guiding principle, this dissertation evaluates the pros and cons of the use of PSCs in peacekeeping and finds that PSCs should be used in peacekeeping operations as a hybridized force where their demonstrated strengths, generally speed and flexibility, are used to maximize effectiveness of instituting UN Security Council-mandated peacekeeping.

KEYWORDS: private security company, private military company, private military and security company military service provider, armed security company, armed humanitarians, peacekeeper, peacekeeping operations, United Nations peacekeeping, Sierra Leone, Bosnia, Angola, right to protect, pros and cons, human security, mercenary, mercenaries, United Nations, protection of civilians

MASTER OF ARTS

Security Studies

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF ARTS IN SECURITY STUDIES

FORMULATING A STRATEGIC RESPONSE PLAN FOR A HIGH-RISK SEISMIC EVENT IN NEW YORK CITY

Michael B. Barvels–Captain, New York City Fire Department
B.S., Queens College, City University of New York, 2003
M.S., John Jay College of Criminal Justice, City University of New York, 2010
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Tom Mackin, NPS Center for Homeland Defense and Security
Second Reader: Lauren Fernandez, NPS Center for Homeland Defense and Security

One of the lessons the Fire Department of New York (FDNY) has learned from the attacks of September 11, 2001 is to be prepared for the inevitable. As one of the world's most renowned emergency response agencies, the FDNY can and should be the model of preparedness for any disaster that may affect New York City (NYC). Historical and scientific data confirms the very real threat of a low frequency, high-risk earthquake affecting the NYC region. Potential for devastation is compounded due to the complexity of NYC's infrastructure and the vast population unfamiliar with this type of natural disaster. The formulation of an FDNY pre-plan for a high-risk earthquake scenario based on extensive information-gathering and the assembly of a dedicated focus group will lessen the impact of a powerful quake while minimizing losses to lives, property, and emergency responders themselves. By being prepared for the seemingly inevitable, the FDNY can live up to its role as one of the world's most respected emergency response agencies.

KEYWORDS: earthquake, FDNY, first responders, New York City, planning, seismic event, strategy, tsunami, vulnerability

COMBATING TERRORISM WITHIN LOCAL POLICING THROUGH CRIME REDUCTION: USING REAL-TIME, SITUATIONAL AWARENESS WITHIN A DISTRIBUTED COMMON OPERATING PICTURE TO COMBAT ALL CRIME AND TERRORISM—V2I2SION PROCESS AND SAFECOP PILOT PROJECT

John A. Bennett Jr., Assistant Chief of Police, Tampa Police Department
B.A., Saint Leo University, 2000
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Co-Advisor: Kathleen Kiernan, Center for Homeland Defense and Security
Co-Advisor: Pat Miller, Center for Homeland Defense and Security

Local law enforcement agencies' role in combating terrorism should center on crime reduction. The crime fighting energy recovered from lowering crime can be converted to proactive efforts, which can root out precursor acts related to the planning and execution of domestic and international terrorism as an operational by-product. To achieve this local momentum, information and intelligence sense-making, within a common operating picture offering real-time situational awareness, can be the key difference in gaining or sustaining the crime reduction, starting this flywheel effect.

Allowing function to follow form within a supporting technology, the V2I2SION process allows a more objective approach to format information-sharing by validating an offense to expend the best return on time; visualization in real-time versus delayed mapping; information-to-intelligence by effective case management

and crime bulletin construction and viewing in real-time; moving toward solutions and debriefed intelligence for future sense-making; and leading to optimization and the next action. A pilot solution named Situational Awareness for Enforcer's Common Operating Picture (SAFECOP) was tested during the 2012 Republican National Convention and showed promising results against an agency's event-strained resources, which is comparable to either a crime reduction plateau or loss of personnel due to localities' budget restraints.

KEYWORDS: situational awareness, common operating picture, sense-making, artificial experience, distributed, technology, compstat, network fusion, recognition heuristic, crime-terrorism nexus, UASI, information and intelligence sharing, information speed, strategic thinking and seeing, V2I2SION, SAFECOP

ESTABLISHING POST-CONFLICT JUSTICE THROUGH U.S. OCCUPATION: MILITARY TRIBUNALS AS A MEANS OF TRANSITIONAL JUSTICE

Adam R. Bock–Major, United States Army
B.A., Colorado State University, December 2001
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Carolyn Halladay, Department of National Security Affairs
Second Reader: Erik Dahl, Department of National Security Affairs

This thesis examines post-conflict justice in Iraq following the U.S. invasion, specifically, the legitimacy of the Iraq High Criminal Court and its first deliberation, the Al-Dujail trial of Saddam Hussein. It asks: How can the United States infuse transitional justice through Western forms of judicial procedures into the democratic transition of non-Western nations under U.S. military occupation?

The analysis begins with the International Military Tribunal at Nuremberg as a model of transformative post-conflict justice. Then it turns to the cloudier legacy of the Tokyo Trials, where the internal contradictions of this approach gathered force in the non-Western context and laid bare the shortcomings of the Nuremberg model. Finally, it examines the Iraqi tribunal, which demonstrated many of the shortcomings of earlier tribunals, to the detriment of the United States and the new Iraqi government.

This thesis does not concern itself with the guilt or innocence of the former Iraqi dictator. The purpose is to better understand how the Coalition Provisional Authority established legal jurisdiction and to review the issues surrounding Saddam's trial. Finally, it suggests judicial processes that could be employed in non-Western cultures to support the transition from an insurgent post-conflict environment to peace.

KEYWORDS: transitional justice, justice, tribunal, Saddam, Hussein, Al-Dujail, Nuremberg, IMT, Tokyo, transformative justice, justice, Iraqi Special Tribunal, high criminal court, post-conflict, reconciliation, victors' justice, victor's justice, CPA, IST, IHCC, IMT, IMT-FE, military tribunal, civil military relations, civ-mil relations, Truth Commission, trial, Iraq, Iraqi

MYTHS AND REALITIES OF MINIMUM FORCE IN BRITISH COUNTERINSURGENCY DOCTRINE AND PRACTICE

Christopher B. Boer–Major, United States Army
B.A., University of West Florida, January 2002
Master of Arts in Security Studies (Defense Decision-Making and Planning), March 2013
Advisor: Douglas Porch, Department of National Security Affairs
Second Reader: Arturo Sotomayor, Department of National Security Affairs

Counterinsurgency scholars and notable counterinsurgents often credit minimum force doctrine, among other factors, for British success in Malaya, Kenya, and Cyprus. Minimum Force has become a prescriptive element for counterinsurgency warfare as a result, often with the understanding that gaining and retaining the population's "hearts and minds" is crucial to achieving victory. Also, minimum force proponents claim excessive force is anathema to that goal, insofar as it alienates the population and delegitimizes the government's

efforts. Minimum force, however, was never a central component of British counterinsurgencies during the decolonialization era following World War II, and its continued inclusion among counterinsurgency formulas is unwarranted based on British experiences. The British relied primarily on coercion, reprisals, exemplary force, and forced relocations—tactics learned during the Irish War of Independence (1919–1921) and subsequent limited wars to starve the insurgents of the population's support.

KEYWORDS: British counterinsurgency, COIN, minimum force, Cyprus, Malaya, Kenya, Irish War of Independence, Ireland, Palestine

SMALL COMBATANTS FOR THE HOMELAND DEFENSE MISSION

Andrew M. Brown–Lieutenant, United States Navy
B.S., United States Naval Academy, May 2005
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: James C. Moltz, Department of National Security Affairs
Second Reader: Wayne Hughes, Department of Operations Research

This thesis examines how the composition of the U.S. fleet, with specific focus on small combatants, affects the ability of the United States Navy to undertake homeland defense missions and provides suggestions to improve its core competency.

Currently, the U.S. Navy relies on a shrinking group of aging Oliver Hazard Perry class frigates to conduct counter-piracy, counter-narcotics, counter maritime insurgency, and maritime engagement missions. The large warships that make up the rest of the fleet are able to undertake these missions, but their cost and capabilities make them better suited for other operations. This thesis examines the proposed littoral combat ship but argues that it is not the ideal ship: it is too expensive, too vulnerable, and undermanned, and it has a modular concept that is too underdeveloped for practical naval operations. Instead, this thesis proposes that the U.S. Navy would be better served by procuring a traditional frigate or corvette to accomplish the variety of missions that fall under the umbrella of homeland defense. Such a traditional small combatant would provide the U.S. Navy with a warship capable of conducting traditional fleet operations as well as operating at the lower end of the spectrum of operations.

KEYWORDS: navy, maritime security, littoral combat ship, homeland defense, frigate, corvette

THE EFFICACY OF FOREIGN ASSISTANCE IN COUNTER NARCOTICS

Jonathan R. Catalano–Major, United States Army
B.S., Virginia Polytechnic Institute and State University, May 2002
MBA, Webster University, March 2007
Master of Arts in Security Studies (Defense Decision-Making and Planning), March 2013
Advisor: James A. Russell, Department of National Security Affairs
Second Reader: Ryan Gingeras, Department of National Security Affairs

This paper analyzes the effectiveness of foreign assistance pursuant to national security objectives. Counter narcotics initiatives in Colombia are utilized in a case-study approach that conducts an analysis of the different components of foreign assistance that were designed to curb the flow of illicit narcotics into the United States. The focus for this study involved the estimated coca cultivation quantities from the 32 different departments in Colombia. The application of assistance applied toward eradication, interdiction, and alternative development programs are delineated in their efficacy toward achieving the desired end state. Additional analysis is made for six of the top coca-cultivating departments in Colombia. Economic factors are also considered as a contributing factor in the overall coca cultivating reduction within Colombia from 2000 to 2011. The intent of this study is to determine whether foreign assistance is an effective tool for achieving security objectives in counter drug policy. Additionally, this thesis aims to provide insight into which components of foreign assis-

tance are more effective at achieving overall illicit crop reductions. Furthermore, this thesis intends to provide recommendations for the future application of foreign assistance pursuant to counter narcotics policy.

KEYWORDS: foreign assistance, foreign aid, developmental assistance, Plan Colombia, interdiction, alternative development, eradication, Andean Counterdrug Initiative, national security, cocaine, coca, FARC

AN ENERGY BRIDGE TOO FAR? UNCONVENTIONAL NATURAL GAS INNOVATIONS AND EURASIA'S ENERGY BRIDGE

Wayne J. Dahl Jr.–Captain, United States Army
B.S., Southwestern College, 2004
Master of Arts in Security Studies (Europe and Eurasia), March 2013
Advisor: Victoria Clement, Department of National Security Affairs
Co-Advisor: Mikhail Tsypkin, Department of National Security Affairs

Energy security has become a key watchword in defining the contemporary security landscape. Although the 1973 oil crisis is likely the most significant energy dispute in modern history, energy conflicts continue to impact nations and citizens around the world. Several energy disputes with Russia in the first decade of the twenty-first century serve as poignant examples of contemporary energy insecurity. The 2006 Russia–Ukraine gas disagreement halted the delivery of 100 million cubic meters of gas to Europe; in 2007, the Russian–Belarus energy clash direly affected Germany's economy. Subsequently, Ukraine siphoned gas from its pipeline to Europe in an attempt to hold European households hostage during a row with Russia over gas prices in 2009. However, unconventional natural gas innovations, such as shale gas and liquefied natural gas (LNG), are dynamically altering the energy security relationships between Russia, the former Soviet republics, and Europe. This thesis will utilize a comparative study of the contemporary natural gas pipeline market and current unconventional gas market to analyze the ramifications both markets have on European and Eurasian energy security, future prospects for expansions, and possible sources of contention within both frameworks, which will lead to an examination of future energy security policy implications.

KEYWORDS: energy, energy security, liquefied natural gas, shale gas, natural gas, pipelines, European Union, Russia, Central Asia, Caspian Basin

DEFINING THE ROLE OF PUBLIC HEALTH IN DISASTER RECOVERY: AN EVALUATION OF STATE PUBLIC HEALTH PLANNING EFFORTS

Nicholas E. Davidson–Public Health Preparedness Director, South Carolina, Department of Health and Environmental Control, Region 2
B.S., McGill University, 1997
M.S., University of South Carolina, 1999
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Lauren Fernandez, Center for Homeland Defense and Security
Second Reader: Anke Richter, Defense Resource Management Institute

There is very little to direct public health planning for long-term disaster recovery. This research surveyed plans from nine hurricane-prone states to determine the extent to which those plans comply with recently published standards from the Centers for Disease Control (CDC) in 2011. An abstraction form was devised to score each plan and to document novel or innovative components within each plan. Results indicate poor compliance with the CDC standards; 79 percent of the assessments of individual preparedness components resulted in a score of zero (on a scale of zero to four). Particularly notable was a lack of planning for continuity of operations and the insufficient plans for advising residents and partner agencies as to the plans and locations for providing services after a disaster. A complicating factor was the general lack of acceptance, by public health, of the fact that public health recovery should be focused on restoring community services instead of

simply restoring operations of public health agencies. This research identifies smart practices that can be adopted by public health agencies in an attempt to ensure a robust level of recovery preparedness.

KEYWORDS: public health, recovery, disaster preparedness, abstraction, planning, continuity of operation, Center for Disease Control and Prevention, hurricanes, hurricane recovery, Hurricane Katrina, Hurricane Rita, South Carolina, Department of Health and Environmental Control

INTERNATIONAL INTERVENTION IN INTRA-STATE CONFLICTS: THE CASE IN SRI LANKA

Athbandanage Indika Priyantha De Silva–Commander, Sri Lanka Navy
B.Sc., Kotalawala Defense Academy, 1997
Master of Arts in Security Studies (Civil–Military Relations), March 2013
Co-Advisor: S. Paul Kapur, Department of National Security Affairs
Co-Advisor: Anshu Chatterjee, Department of National Security Affairs

This thesis attempts to understand various factors involved with the intervention of powerful countries in the affairs of weaker countries, taking the Indian intervention in Sri Lanka as a case study. It examines shifts in India's intervention decisions during the period between the contemporary independence of both countries and the end of the ethnic conflict in Sri Lanka in 2009. The thesis primarily focuses upon four significant incidents that triggered intervention by India in Sri Lanka, and explores how India's domestic concerns and strategic interests affected its intervention decisions under various socio-economic and geo-political situations.

By analyzing both strategic and domestic concerns and how they impacted India's intervention in Sri Lanka during the concerned period, this thesis argues that the Indian decision for intervention in Sri Lanka was deeply shaped by its strong domestic concerns. The Indian government adjusted its intervention decisions to maintain the domestic stability of the country, irrespective of the strategic impact of intervention. Even though the Indian government preferred to maintain a cordial relationship with Sri Lanka, domestic pressure could compel the Indian government to intervene in Sri Lanka. Sometimes, India decided not to intervene when the pressure on the central government was weak or when more important domestic concerns arose which favored non-intervention. As far as India's intervention decisions in the future are concerned, domestic factors will constrain India's flexibility in shaping decisions to intervene in Sri Lanka.

KEYWORDS: India, Sri Lanka, intervention, Tamil Nadu, LTTE, Indo-Lanka relations, ethnic conflict, Tamil nationalism, IPKF, domestic concerns, strategic concerns, Indian hegemony, South Asia

MEASURING SECURITY EFFECTIVENESS AND EFFICIENCY AT U.S. COMMERCIAL AIRPORTS

Daniel Diehl–Battalion Chief, Atlanta Fire Rescue Department (Retired),
Fire Science Coordinator, Atlanta Technical College
B.S., Covenant College, 2005
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: James Wirtz, National Security Affairs
Second Reader: Christopher Bellavita, National Security Affairs

Civil aviation contributes over $900 billion to the U.S. economy annually, and the cost of securing U.S. aviation against criminal and terrorist attack runs in the billions of dollars. Therefore, it is critical to use appropriate metrics in managing the security policy and programs. Nonetheless, aviation security has typically evolved haphazardly as a reaction to changing criminal events, often resulting in widespread controversy. The U.S. Government Accountability Office and the media have questioned many Transportation Security Administration procedures. This thesis uses formative program evaluation and policy analysis to investigate the current assessment of airport security programs. It identifies innovative public administration and policy-analysis

tools that could provide potential benefit to airport security. These tools will complement the system-based Risk Management Framework if the Transportation Security Administration involves more stakeholders in collecting and analyzing pertinent data, proactively planning, and developing solutions.

KEYWORDS: aviation security, performance measurement, security metrics, public administration, commercial airports, security strategy, homeland security

FRANCE: NUKES STUCK BETWEEN NATO AND EU

Andrew J. Dietzel–Lieutenant, United States Navy
B.S., Massachusetts Maritime Academy, June 2007
Master of Arts in Security Studies, September 2009
Advisor: Donald Abenheim, Department of National Security Affairs
Co-Advisor: Carolyn Halladay, Department of National Security Affairs

Today, with NATO incorporating policy and strategic changes amid the new perceived threat since September 11, 2001, France must again rethink and recalibrate its nuclear policy. At least since the end of World War II, France has wanted to play a larger role within European politics, financial affairs, and defense, and specifically, it has signified that Paris would offer regional nuclear deterrence for Europe. On the one hand, such an enhancement of France's profile within European defense and deterrence would fulfill the fondest Gaullist aspirations for France as a world power and for European defense autonomy. On the other hand, practical considerations—economic, political, and strategic—may break French ambitions.

Thus, this thesis ultimately argues that although France may aspire to take center stage in European nuclear defense, it is in no practical or political position to do so. And even if France could present a credible nuclear deterrent for the region on its own, further strategic and political considerations militate against France assuming a different role in European defense. Without question, there may be more for France to do in this regard, but only in connection with NATO and the United States.

KEYWORDS: France, nuclear deterrence, the United States of America, North Atlantic Treaty Organization, European Union

PREPARING SOUTH CAROLINA EMERGENCY DEPARTMENTS FOR MASS CASUALTIES WITH AN EMPHASIS ON THE PLANNING PROCESS

Colleen Mary Donovan–State WIC Director, Department of Health and Environmental Control, Columbia, South Carolina
B.S., University of Wisconsin-Stout, 1987
M.S., Eastern Kentucky University, 1988
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Nadav Morag, Center for Homeland Defense and Security
Second Reader: Michael Petrie, National Security Affairs/Intelligence Programs Office

This thesis addresses the role of the emergency department in planning for mass casualties during an emergency. The demand on hospital emergency departments has stretched the capacity for normal operations beyond their original design. Hospital surge capacity is not only complex but affects every hospital emergency department in the country. Factors, such as hospital bed capacity, surge levels, staffing and the use of volunteers in time of emergency, all play critical roles in the ability and accessibility of the hospital to react during times of need.

The recommendations provided, based on the analysis of county, state, and federal plans along with case studies that provide a varied approach to emergency preparedness and the role of the hospital, focus on some of the facets of preparedness and the immediate need for emergency planning, training/exercising and com-

munication in hospitals across America and specifically, in hospitals in South Carolina.

KEYWORDS: emergency departments, mass casualties, hospital surge capacity, planning process

MYTH, METAPHOR, AND IMAGINATION: FRAMING HOMELAND SECURITY AS ART AND ARCHETYPE

Veronica H. Epley–Policy Analyst, U. S. Department of Homeland Security
B.A., University of Rochester, May 1971
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Christopher Bellavita, Center for Homeland Defense and Security
Second Reader: Lauren Wollman, Center for Homeland Defense and Security

Art, myth, metaphors, and archetypes can foster divergent thinking and serve as channels for integrating imagination and evocative ambiguity into traditional analysis and problem solving. New ways of representing ideas about homeland security not only provide vehicles for communication but also expand and improve our ability to contemplate and understand this complex, emerging discipline.

Through this paper and three original artworks, I argue for admitting art, imagination, and the searching attitude of humanism into the domain of homeland security. I use the myth of Perseus and Medusa to focus on the mirrored shield as a metaphor for seeing ourselves as part of the predicament and for regarding the response not simply as solution, but as creative evolution. The metaphors we choose, consciously or unconsciously, to tell the story of homeland security will frame not only what we think but how we act and how we are perceived.

Art is not frivolous. It is both mirror and shield and allows us to move, stretch, and reach to transform reality. Art is forward-leaning and operates in a non-linear or supra-linear process whose edges, mass, margins, and shadows expand the universe of possibilities and pre-suppose the existence of new forms.

KEYWORDS: homeland security, art, archetypes, myth, metaphor, imagination, creativity, cultural evolution, semiotics, 9/11, black swan events, blue ocean strategy, mindfulness, memetics, attention, poetry, systems thinking, hero's journey, Joseph Campbell, Jung, Csikszentmihalyi, strategic communications

DOES HOMELAND SECURITY CONSTITUTE AN EMERGING ACADEMIC DISCIPLINE?

Michael D. Falkow–Assistant City Manager, City of Inglewood, California
B.S., California State University at Fullerton, 1990
M.S., California State University at Fullerton, 1994
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Co-Advisor: Nadav Morag, Center for Homeland Defense and Security
Co-Advisor: Stanley Supinski, National Security Affairs

In the wake of 9/11, the enterprise now called homeland security rocketed into the limelight leaving an educational gap that many academic institutions rushed in to fill. Educators and scholars alike from various disciplines rallied together to form a useful curriculum, and in doing so, they established a new community that shares a common intellectual commitment to making insightful, valuable, and practical contributions to the sphere of human knowledge focused on societal resilience and prosperity. Once the dust settled, a debate began to unfold. Is homeland security an emerging academic discipline? This paper seeks to answer the question by defining a common analytical framework for what constitutes an academic discipline including the concept of legitimacy and the interrelationships or "co-evolution" between academia, industry, and government. It then compares through qualitative research and weighted scoring several widely accepted disciplines to see how they fit within this model. Finally, given the persistent threat of natural and manmade disasters, steady funding and continuous career prospects, ongoing rapid advances in technology, and systematic widespread integration into university curricula, this research concludes that homeland security has begun its emergence

as a formal academic discipline, especially given the interdisciplinary nature of its dynamic and complex domain.

KEYWORDS: academic discipline, co-evolution, co-evolutionary, complexity, curriculum framework, future homeland security, interdisciplinarity, interdisciplinary, legitimacy, prosperity, prosplexity

COMBATING SEX TRAFFICKING: THE STRATEGIES OF THE UNITED STATES AND THE UNITED KINGDOM

Neal J. Ferry–Lieutenant, United States Navy
B.A., University of Pittsburgh, May 2002
Master of Arts in Security Studies (Europe and Eurasia), March 2013
Advisor: Ryan Gingeras, Department of National Security Affairs
Second Reader: Mikhail Tsypkin, Department of National Security Affairs

The trafficking in persons for sexual exploitation is a worldwide problem. The international community is engaged in addressing this problem. One of the major issues associated with sex trafficking is that its severity is ultimately unknown. While the majority of government and NGO research indicates sex trafficking victims number in the hundreds of thousands or millions, some academic researchers argue these statistics are inaccurate. In the United States, there are federal and state laws empowering prosecutors and police officers. Law enforcement efforts involve operations conducted at the international, state, and local levels. Education and training programs designed for criminal justice practitioners and the general public take place in the classroom and through the Internet. In the United Kingdom, legislation is also in effect to empower prosecutors and police officers. Law enforcement efforts are also conducted at the international and local levels. Training and education are also available for the general public and law enforcement communities. Both nations have evaluated their efforts in attempting to make improvements. While the U.S. and U.K. are actively engaged in combating sex trafficking, the unknown severity of the issue makes it difficult to determine success or failure of the efforts in place.

KEYWORDS: sex trafficking, human trafficking, trafficking in persons, United States, United Kingdom.

FUSION CENTERS AND FEDERALISM: EROSION OR ENHANCEMENT?

Thomas E. Fries–Lieutenant Commander, United States Navy
B.S., United States Naval Academy, May 1997
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Carolyn Halladay, Department of National Security Affairs
Second Reader: Erik Dahl, Department of National Security Affairs

This thesis examines the broader federalism implications of fusion centers. From a constitutional perspective, these bodies matter because they stand squarely at the crossroads of federal, state, law enforcement, and intelligence concerns. Although collating state law enforcement information existed prior to 9/11, the growing linkage with a national homeland security mission spawns an entirely new set of issues.

The lines separating the levels and responsibilities of government, once clear and distinct, have now become ambiguous and confusing, thereby enabling states to reassert their power vis-à-vis the federal government. The decentralized nature of the overall homeland security apparatus and the growing complexity of the assigned tasks enables fusion centers and thus the states themselves to rise in stature. Because each state is free to tailor its own security framework, fusion centers enjoy the kind of flexibility urgently needed in today's domestic security environment.

This thesis addresses the recent advances in federalism by exploring two pillars of fusion center characteristics. The first section can be construed to be the "hardware" piece, that is, the missions and structures under which they operate. The second section investigates the "software" side, or the databases and networks

containing the information and intelligence

KEYWORDS: homeland security, federalism, fusion centers, information sharing environment, constitution, Tenth Amendment, networking, civil liberties, intelligence, HSIN, HSINT, JTTF, DHS, law enforcement, national security, FBI

THE SECURITIZATION OF MIGRATION: AN ANALYSIS OF UNITED STATES BORDER SECURITY AND MIGRATION POLICY TOWARD MEXICO

James M. Garrett–Lieutenant, United States Navy
B.S., Jacksonville University, December 2006
Master of Arts in Security Studies (Western Hemisphere), March 2013
Advisor: Rodrigo Nieto-Gómez, Department of National Security Affairs
Second Reader: Robert Looney, Department of National Security Affairs

By examining securitization speech acts and the organizational behavior of the agencies tasked with controlling border security and immigration, this thesis will examine the consequences of security discourse on United States policies for the borderlands, the impact of escalating speech acts for the securitization of those key territories, and the limits placed upon political leaders and relevant organizations by institutional forces. Specifically, this thesis will examine the implementation and consequences of guest-worker programs between the United States and Mexico during World War I and World War II. In addition, this thesis will examine how organizational behavior shaped the ability of United States government agencies to implement and enforce border security and labor policy.

KEYWORDS: securitization, migration, immigration, deportation, border security, United States Border Patrol, Immigration and Naturalization Service, organizational behavior

SUSTAINING STATEWIDE DISASTER RESPONSE CAPABILITIES FROM A FIRE SERVICE PERSPECTIVE

Richard G. Giusti–Battalion Chief, San Antonio Fire Department
B.A., American Military University, May 2011
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Lauren Fernandez, NPS, Center for Defense and Security
Second Reader: Glen Woodbury, NPS, Center for Defense and Security

The events of 9/11 and Hurricane Katrina have forever changed the way we look at disaster readiness and response from an emergency-response perspective at the local, state, and federal levels of government. A public expectancy of preparedness and resilience for emergency-response organizations that leverages collaboration in order to meet mission requirements is a primary focus of government. To assist emergency-responder readiness at the state and local levels of government, the federal government has increased homeland security spending by more than 350 percent since 2001 (Federal Emergency Management Agency 2012). Because of current fiscal constraints posed by a lagging economy, local and state emergency responders must find a more efficient way to prepare and manage disaster preparedness and response. Using the state of Texas as its focus, a policy analysis of centralized and decentralized disaster response has been studied in order to explore more efficient methods of disaster response. The emphasis is an analysis of how the fire service in Texas is integrated into Texas Task Force 1 Urban Search and Rescue, and how the statewide model of disaster response could be organized to maximize cost effectiveness and emergency responder capability.

KEYWORDS: disaster response, US&R, hazardous materials, fire service, technical rescue, weapons of mass destruction (WMDs), fire department special operations, homeland security, Texas disaster response framework

SHOULD COPS BE SPIES? EVALUATING THE COLLECTION AND SHARING OF NATIONAL SECURITY INTELLIGENCE BY STATE, LOCAL, AND TRIBAL LAW ENFORCEMENT

David C. Gomez–Assistant Special Agent-in-Charge (Retired),
Federal Bureau of Investigation, Seattle, WA
B.S., University of La Verne, July 1983
Master of Arts in Security Studies (Homeland Defense and Security), March 2013
Co-Advisor: James J. Wirtz, Department of National Security Affairs
Co-Advisor: Robert L. Simeral, Department of National Security Affairs

Presidential commissions, Congress, and numerous national law enforcement groups have noted that the unfettered collection and sharing of intelligence is key to the prevention and mitigation of terrorism in the United States. The sharing of classified national security intelligence collected by the United States intelligence community with nonfederal law enforcement is, however, problematic particularly since the tragic events of September 11, 2001. This thesis examines problems associated with the collection and sharing of classified national security intelligence with and by state, local, and tribal law enforcement. It explores four policy options for the collection and sharing of national security intelligence: intelligence-led policing, the Nationwide Suspicious Activities Reporting Initiative; the FBI's Joint Terrorism Task Force; the National Counterterrorism Center/National Fusion Center; and the British Special Branch system. It recommends an American adaptation of the British Security Service and the Metropolitan Police Service's Special Branch model meant to improve the sharing of classified national security intelligence vital to the protection of the homeland. The recommendations in this thesis are designed to promote a debate on the utility and feasibility of classified national security intelligence collection within the homeland by state, local and tribal law enforcement.

KEYWORDS: intelligence-led policing, nationwide suspicious activities reporting initiative, Federal Bureau of Investigation, Joint Terrorism Task Force, National Counterterrorism Center, National Fusion Center, Special Branch, British Security Service, Metropolitan Police Service, national security, intelligence, intelligence sharing, intelligence collection, domestic terrorism, transnational terrorism

DOES U.S. ARMY HUMINT DOCTRINE ACHIEVE ITS OBJECTIVES? WHAT HAVE IRAQ AND AFGHANISTAN TAUGHT US?

Walter A. Gonzales–Chief Warrant Officer 2, United States Army
B.A., University of Northern Colorado, May 1997
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Wade L. Huntley, Department of National Security Affairs
Co-Advisor Second: Gary D. Espinas, Colonel, Department of National Security Affairs

The most vital source of national intelligence information is derived from human intelligence (HUMINT). HUMINT, the eldest intelligence discipline, has proven to be a force multiplier for commanders during the Global War on Terror.

As the Army downsizes its forces, refocuses priorities, and prepares for its Army 20/20 vision, it will need to ensure that HUMINT remains at the forefront. In the coming years, the Army plans to downsize its force by 80,000 troops; it will also shift its focus towards the Asia-Pacific region. As this transition happens, the Army should capitalize on ten years of operational experience. The Army currently possesses a large number of professional and experienced collectors and has a unique opportunity to analyze their knowledge to answer the question: Does U.S. Army HUMINT doctrine achieve its objectives?

To address this question, the author describes problems encountered by HUMINT in Iraq and Afghanistan. By identifying issues, the Army can adjust its doctrine and training to meet the changing needs of the nation. The author proposes that the Army should restructure the HUMINT MOS to better fit the current operations. This would improve the quality of the collector and eliminate shortcomings identified by HU-

MINT professionals.

KEYWORDS: HUMINT, Army, military source operations, interrogations, intelligence, FM 2-22.3, 35M, 351M, intelligence collection, human intelligence

GOING BEYOND THE WATER'S EDGE: IMPROVING CONGRESSIONAL OVERSIGHT FOR THE DEPARTMENT OF HOMELAND SECURITY

Manuel Gonzalez–Major, United States Army
B.A., Washington State University, 2002
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Robert Looney, Department of National Security Affairs
Second Reader: Erik Dahl, Department of National Security Affairs

This thesis seeks to answer the question: How can Congress improve its oversight of the Department of Homeland Security (DHS)? It is widely accepted that congressional oversight of DHS is, at best, not optimal. Currently, 108 committees and subcommittees have jurisdiction over DHS. To provide some perspective, the Department of Defense (DOD) falls under only 36, with more than 10 times the budget. The jurisdictional disparity between the committees and subcommittees is preventing Congress from providing efficient and effective oversight, which is negatively affecting DHS's ability to perform its function as the lead federal agency in homeland security. The desired end-state for this research project is to determine why Congress has failed to engage in reforms and what changes, if any, are feasible in improving congressional oversight of DHS.

KEYWORDS: homeland security, Department of Homeland Security, Congress, congressional oversight

POLICING IRANIAN SANCTIONS: TRADE, IDENTITY, AND SMUGGLING NETWORKS IN THE ARABIAN GULF

Michael J. Janecek, U.S. Special Agent
B.A., University of Nevada, Las Vegas, December 2001
Master of Arts in Security Studies (Middle East, South Asia, and Sub-Saharan Africa), March 2013
Advisor: Ryan Gingeras, Department of National Security Affairs
Second Reader: Robert Looney, Department of National Security Affairs

There are continual debates regarding the effectiveness of United Nations Security Council Resolutions (UNSCR) 1803 and 1929 as tools for limiting the Islamic Republic of Iran's goals for a nuclear program. This thesis examines the enforceability of the maritime sections of both resolutions at the police level in the Gulf Cooperation Council (GCC) countries. Arab nations along the Arabian Gulf have had long-standing maritime trade relations with Iran and the greater Indian Ocean that extend generations into history. This relationship led to the extensive merging of Arab and Persian cultures in the GCC, as well as the growth of an immigrant workforce from South Asia. With this influx of identities and nationalities, challenges developed in enforcing both resolutions, specifically relating to the inspection of Iranian maritime cargo. Alongside this merging of cultures is the growth of successful maritime drug-smuggling networks that weapons proliferators could exploit to intentionally violate UNSCR 1803 and 1929. Based on the challenges of maritime trade, cultural and national identity, as well as criminal activity, it is argued that both resolutions are an unnatural fit in the Arabian Gulf and are, therefore, questionable as policy choices in the GCC countries.

KEYWORDS: Islamic Republic, Iran, Revolutionary Guard Corps, IRGC, IRGC-QF, sanctions, UNSCR 1803, UNSCR 1929, illicit networks, IRISL, maritime domain awareness, maritime shipping, Gulf Cooperation Council, Arabian Gulf, effect of sanctions, nuclear program, nuclear weapons, proliferation, smuggling

THE LONG AND WINDING ROAD: POST-9/11 INTELLIGENCE REFORMS A DECADE LATER

David R. Johanson II–Lieutenant, United States Navy
B.A., University of California, Berkeley, December 2001
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Robert Simeral, Department of National Security Affairs
Co-Advisor: Erik Dahl, Department of National Security Affairs

The establishment of the Department of Homeland Security (DHS) and passage of the Intelligence Reform and Terrorism Prevention Act (IRTPA) shortly after the terrorist attacks of September 11, 2001 collectively constitute the most significant bureaucratic shakeup of the national security apparatus since the National Security Act of 1947. Roughly 10 years following the creation of DHS, questions linger as to whether these reforms have addressed the major domestic intelligence shortfalls identified in numerous post-9/11 congressional hearings and in the final report of the 9/11 Commission.

This thesis seeks to answer those questions by examining the performance of the U.S. domestic intelligence system since 9/11 along three fronts: intelligence fusion, institutional evolution, and intelligence prioritization. Citing the literature from current and former homeland security practitioners, academic experts, non-partisan analysts, and print media commentators, this paper concludes that while key measures of progress on these fronts have been observed, shortfalls within the domestic intelligence system nevertheless remain, requiring further oversight and guidance from federal homeland security policymakers.

KEYWORDS: Department of Homeland Security, Office of Intelligence and Analysis, Intelligence Reform and Terrorism Prevention Act, director of national intelligence, National Counterterrorism Center, intelligence reform, domestic intelligence, fusion centers

INCREASED ANTI-MONEY-LAUNDERING BANKING REGULATIONS AND TERRORISM PROSECUTIONS

Albert L. Kao–Assistant Special Agent in Charge, Transportation Security Administration
BBA in Accounting, Texas A&M University, 1990
BBA in Information Systems, Texas A&M University, 1990
MBA, University of Washington, 2007
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Lauren Fernandez, Center for Homeland Defense and Security
Second Reader: Michael Freeman, Center for Homeland Defense and Security

After 9/11, anti-money-laundering banking regulations were increased to counter terrorism financing. This study attempts to identify whether increasing banking regulations has countered terrorism financing by reviewing terrorism prosecutions. This study looked at federal terrorism prosecutions from January 2004 through April 2009. The study reviewed court documents and case backgrounds for indicators that anti-money-laundering banking regulations were useful to the terrorism prosecution by either detecting terrorism financing or by supporting other charges such as money laundering. The study did not find that banking regulations detected terrorist financing. The avoidance of banking regulations was used to support money laundering charges in two cases; however, pre-9/11 regulations would have sufficed. The study finds that increasing anti-money-laundering banking regulations has not countered terrorism financing. How anti-money-laundering banking regulations are implemented within a counter-terrorism finance regime should be reevaluated.

KEYWORDS: anti-money-laundering, banking regulations, cash transaction reports, money laundering, terrorism finance, U.S. Patriot Act, confidential informants, prosecutions, Financial Action Task Force (FATF), Financial Crimes Enforcement Network (FinCEN), U.S. Department of Treasury

APPLYING THE ISRAELI PRACTICE OF RECONSTRUCTION FOLLOWING A TERRORIST ATTACK AS A MODEL FOR CITIES IN THE UNITED STATES

Robert J. Kelly–Executive Director, Westchester Intelligence Center,
Westchester County, Office of the District Attorney, White Plains, New York
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Nadav Morag, Center for Homeland Defense and Security
Second Reader: David Brannan, Center for Homeland Defense and Security

A component of the Israeli counter-terrorism policy includes a strategic choreographed response to restore and reconstruct physical damage caused by a terrorist attack with the goal of removing all markings of the attack in an expeditious timeframe. The investment of reconstructing a damaged scene is intended to yield increased resiliency for the impacted population and to devalue the fear intended to be delivered with the attack. The critical element of the Israeli model is that the government accepts that attacks will occur and has developed a response for such attacks beyond aiding the injured and processing a crime scene.

Application of the Israeli model to the United States merits review as there is a strong likelihood that future terrorist attacks will occur on domestic soil in the United States, and a best practice may be extrapolated from the Israeli model. The intended restoration of normalcy that follows Israel's reconstruction efforts is designed to mitigate the psychological impact of a terrorist attack and serve as a palm to the damaged psyche of an impacted population. The State of Israel recognizes that the element of fear is a co-conspirator in terror attacks and has developed a response to it.

The subject of this thesis will address the specific response of reconstructing a damaged scene following a terrorist attack.

KEYWORDS: resilience, resiliency, normalcy, impact, terrorism, policy, counter-terrorism, reconstruction, suicide attacks, suicide bombings

EXPANDING THE ROLE OF EMERGENCY MEDICAL SERVICES IN HOMELAND SECURITY

Malcolm T. Kemp, Deputy Chief of Operations,
Leon County Emergency Medical Services, Tallahassee, Florida
B.S. Florida State University, June 2005
Master of Health Education, December 2007
Master of Arts in Security Studies (Homeland Security and Defense), 2013
Advisor: Lauren Fernandez, Department of National Security Affairs
Second Reader: Michael G. Petrie, Director, Santa Clara EMS

Emergency medical services (EMS) has an established nationwide workforce that has not participated in homeland security as a full partner. EMS is a profession in transition that is looking to establish its identity and expand in ways that enhance its overall mission. This thesis explores the role of EMS in response, recovery, acting as intelligence sensors, participation in fusion centers, and syndromic surveillance to see if there are practical applications and logical integrations that could provide value to homeland security. EMS has an opportunity to take advantage of new models and technologies to meet the needs of the citizens and to improve the outcomes of patients. EMS should consider what expanded roles in homeland security enhances the EMS profession, improves security at home, and meets current goals of EMS across the nation. A comparative analysis, application, evaluation, measurement, and vulnerability assessment provided several potential new roles for EMS in homeland security.

KEYWORDS: emergency medical services, EMS, emergency medical, EMS response, EMS recovery, EMS today, EMS intelligence, EMS receiving intelligence, EMS disaster response models, damage assessment, syndromic surveillance, public health models, EMS and homeland security, fusion centers, fire models

GOING GLOBAL: THE ECONOMIC AND GEOPOLITICAL EFFECT OF CHINA'S INCREASING OUTWARD FOREIGN DIRECT INVESTMENT

Patrick L. Kiefer–Lieutenant, United States Navy
B.S., Oregon State University, June 2006
Master of Arts in Security Studies (Far East, Southeast Asia, and the Pacific), March 2013
Advisor: Alice L. Miller, Department of National Security Affairs
Co-Advisor: Robert Looney, Department of National Security Affairs

Since at least 2002, Beijing has emphasized a policy of "going global" for state-owned enterprises, as well as privately-owned domestic enterprises, that has led to over $68 billion of outward foreign direct investment from China. Outward foreign direct investment has been speculated as one possible medium for Beijing to exert soft power or engage in economic diplomacy, yet there is scant analysis on how OFDI has affected the Asia-Pacific regional geopolitical environment. This thesis attempts to bridge this gap in understanding by analyzing the economic effect of Chinese OFDI actions, presenting the historic and current scope of Chinese OFDI, interpreting Chinese OFDI through the lens of economic theory and realist theory, and tracking the changes in the geopolitical environment in the Asia-Pacific region since 2002 on a country-by-country basis. Overall, Chinese OFDI appears to be mostly in line with economic theory and has provided modest benefits to the Chinese economy, but there have been inconsistent and unpredictable shifts in the geopolitical environment in the Asia-Pacific region during China's "go global" campaign.

KEYWORDS: China, OFDI, outward foreign direct investment, Chinese economy, security, Asia, Asia-Pacific, geopolitics

CAUGHT IN THE MIDDLE AT THE U.S.–CANADIAN BORDER

Kyle W. Killingbeck–Lieutenant, United States Navy
B.S., Eastern Michigan University, December 2006
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Carolyn C. Halladay, Department of National Security Affairs
Second Reader: Robert L. Simeral, Department of Information Sciences

The U.S.–Canadian relationship encompasses strong partnership and economic interdependence; however, policy conflicts are prevalent throughout its history. Acute events—for example, the September 11, 2001, terror attacks—exacerbate the conflict while raising the stakes of disunity between these two long-standing allies. Opposing policy priorities also undermine and interfere with their relationship. American policymakers have a security-first mindset while Canadians are primarily focused on efficient cross-border trade. Caught in the middle are the Great Lakes regional states that must straddle this policy divide.

This thesis addresses the policy imbalance between the United States and Canada and considers how this dynamic affects both countries and the Great Lakes regional states through historical and contemporary lenses. In addition, a potentially disastrous but plausible future scenario addresses the detrimental consequences of maintaining the status quo in Washington and Ottawa. This analysis draws on numerous scholarly works and a variety of governmental reports, hearings, and strategies. The examination then turns to federal, state, and local border concerns as well as institutional capabilities for comparison. Finally, policy recommendations focus each of the primary border players in the Great Lakes region on balancing its various economic and security interests along the shared border.

KEYWORDS: United States, U.S., Canada, Canadian, Great Lakes, St. Lawrence Seaway, border, border security, border policy, northern border security, maritime security, trade policy, unilateralism, burden-shifting

KASHMIR—THE KEY TO PEACE IN AFGHANISTAN

Patrick J. Larkin–Lieutenant Commander, United States Navy
B.S., College of Charleston, May 2000
MBA, University of Colorado, December 2007
Master of Arts in Security Studies (Middle East, South Asia, and Sub-Saharan Africa), March 2013
Advisor: James Russell, Department of National Security Affairs
Second Reader: Feroz Khan, Department of National Security Affairs

This thesis evaluates the conflict between India and Pakistan over Kashmir and provides an analysis of the impact this conflict has in Afghanistan. It examines why India and Pakistan maintain respective claims over Kashmir and discusses the problem the United States faces in Afghanistan because of the extension of Indo-Pak rivalry into the Afghan conflict. The thesis analyzes the regional rivalry through the lens of offensive realism and explains the impact of regional terrorism that has spawned primarily because of perpetuation of the conflict over Kashmir. The thesis concludes that lasting solution to the Kashmir conflict will allow both India and Pakistan to redeploy valuable diplomatic and military resources elsewhere in the region. This will then enable India and Pakistan to assist the stabilization of Afghanistan on a unified front. The United States will not be able to achieve a lasting peace in Afghanistan without the unilateral support of Pakistan and India. If the conflict in Kashmir can be reconciled, this will aid U.S. objectives of a secure Afghanistan.

KEYWORDS: South Asia, Pakistan, Afghanistan, India, Kashmir, realism, terrorism, U.S. security

BUILDING PEACE IN POST-ASSAD SYRIA

Jacob M. Maddox–Lieutenant, United States Navy
B.A., Norwich University, May 2007
Master of Arts in Security Studies (Middle East, South Asia, and Sub-Saharan Africa), March 2013
Advisor: Anne Baylouny, Department of National Security Affairs
Second Reader: Robert Springborg, Department of National Security Affairs

Syria's civil war remains a bloody stalemate between government forces and various opposition groups. The conflict continues to impact neighboring states with spillover fighting and increased economic burdens from refugees. In light of both Syria's importance to regional stability and recent lessons learned from a lack of post-conflict planning, it is important for academics and policy makers to consider potential stabilization policies for a post-conflict Syria.

This thesis explores a scenario in which a post-Assad Syria faces a transition from civil war toward peace with its current borders and internal divisions. Under this construct, the challenges of creating a security environment, engineering a democracy, and achieving reconciliation stand out as both opportunities and obstacles in building a lasting peace in a divided Syria. Different approaches to each of these challenges are analyzed by comparing theoretical literature and case studies. In drawing lessons from different states' shared experiences, a rough outline of best practices is drawn. Finally, Syria's specific context is applied, offering a potential framework for a post-conflict Syria to build its peace.

KEYWORDS: Syria, post-Assad, post-conflict security, negotiated peace settlement, international peacekeeping, disarmament, security sector reform, democracy, power consolidation, power dividing, power sharing, reconciliation, truth commission, post-conflict justice

MESSAGE IN A BATTLE: AN ANALYSIS OF PRESIDENTIAL COMMUNICATION SINCE 9/11

Jacqueline Maguire–Supervisory Special Agent, Federal Bureau of Investigation
B.S., Villanova University, 1996
M.S., Long Island University, 1999
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Thesis Co-Advisor: Robert Josefek, Department of Homeland Security
Thesis Co-Advisor: Anders Strindberg, Department of Homeland Security

The use of public diplomacy is an essential component of counterterrorism efforts, but to date, the United States has not been as effective in its attempts to utilize strategic communication against the threat of violent Islamic extremism as it has been in its utilization of military, intelligence, and law enforcement resources. Based upon the idea that a retrospective analysis of previous presidential speeches could provide guidance for future strategic communications of U.S. government officials, this thesis identifies the nature of the message delivered by U.S. presidents to foreign audiences since the 9/11 attacks through a qualitative analysis of a purposeful sampling of 50 speeches and statements. The analysis examines the position of the United States government in the ideological debate with violent Islamic extremists to determine whether the United States has taken a largely defensive stance, in which the United States constantly strives to counter the narrative of violent extremist adversaries, or a more forward-leaning posture, in which the United States remains primarily concerned with presenting its own narrative based on its values and ideals. The results of this analysis are then utilized to offer recommendations on modifying the message to better support U.S. efforts to combat violent Islamic extremism.

KEYWORDS: public diplomacy, strategic communication, ideology, narrative, counter narrative

WHY SOME PEOPLE LIVE AND SOME PEOPLE DIE IN THE SAME EMERGENCIES AND DISASTERS: CAN THE GENERAL PUBLIC BE TAUGHT TO SAVE THEMSELVES?

Stephen Marsar–Captain Fire Department, New York City, New York
B.S., SUNY Empire State College, 2009
Master of Arts in Security Studies (Homeland Defense and Security), March 2013
Thesis Advisor: Fathali M. Moghaddam, Department of National Security Affairs
Second Reader: James Breckenridge, Dean of Academic Administration and Operations, Palo Alto University, Palo Alto, CA

Each year the United States suffers approximately 3,000 fire-related deaths and approximately 4,700 work-related deaths. Hundreds of additional fatalities occur annually due to severe weather as well as manmade and natural disasters. The specific research question addressed by these sobering statistics is as follows: Can the general public be taught to save themselves during emergencies and disasters? To that end, the research answered the following questions: 1) What research has been previously performed to examine civilian survivability? 2) What are the cognitive functions that allow or prohibit people in making correct life-saving decisions? 3) Are there patterns to the way that people process information and perceive danger? 4) What are the critical elements that allow some people to survive and others to perish? 5) What can be done to increase the chances that civilians will make the correct choice of action during emergencies and disasters?

Through descriptive research, the purpose was to examine and reveal the importance of human behavior and to produce recommendations that may help reduce fatalities. The literature review found an abundance of material available to address the topic. As heuristics (science of trial and error), utility theory (methodical evaluation of alternative choices), human reactions (such as fear, intuition, emotion, and past experience), and group-versus-individual dynamics each impact the decision-making process, the research concluded that the general public can be taught how to perform and react appropriately during emergencies. The recommendations included legislating mandatory training on emergency action plans in the workplace, enhancing the efforts of emergency responders in public education, and developing public/private partnerships to provide

realistic information and scenario-based drills that the public can comprehend and participate in.

ABSENT AUTHORITY: FAILURE TO PLAN FUNDING AND COMMAND AUTHORITIES IN USAF SECURITY ASSISTANCE UNITS

Steven A. Marshall–Major, United States Air Force
B.S., United States Air Force Academy, May 2000
Master of Arts in Security Studies (Defense Decision-Making and Planning), March 2013
Advisor: James Russell, Department of National Security Affairs
Second Reader: Thomas-Durrell Young, Center for Civil–Military Relations

This thesis will look at the capability development of USAF BP/BPC units using current programs such as the 6th Special Operations Squadron and detailed case studies of Farm Gate and the current Mobility Support Advisory Squadron. The focus is on both success and where the USAF falls short when developing BP/BPC capability. The thesis follows the planning process and initial assumptions of both Farm Gate and the MSAS with a breakdown of the two major planning oversights. First, the study will examine the lack of funding authority as a problem that needs correction at Air Force Headquarters and legislative levels by creating a globally applicable authority for building partnership. Second, the study will focus on problems with command authorities, specifically the unwillingness of AMC to transfer authority to the GCC. Finally, potential solutions and recommendations on all levels are proposed, from the unit to national-level policy. The paper reveals shortfalls in the planning process, but it also shows the extraordinary efforts of the airmen involved in the squadrons. From Farm Gate to the MSAS, the ultimate success of these efforts rests on the professionals who support the squadrons.

KEYWORDS: building partnership, building partner capacity, Mobility Support Advisory Squadron

IMPROVING STRATEGIC PLANNING FOR FEDERAL PUBLIC HEALTH AGENCIES THROUGH COLLABORATIVE STRATEGIC MANAGEMENT

Jennifer L. Martin–Deputy Director, Baltimore City Health Department
B.S., St. Lawrence University, 1996
J.D., University of Maryland School of Law, 2007
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Rodrigo Nieto-Gomez, Center for Homeland Defense and Security
Second Reader: Ivan Zapata, Department of Homeland Security

Collaborative strategic management of public health emergency and homeland security issues can address gaps in roles and responsibilities and foster better coordinated planning at the federal level. Recent changes in the alignment of the national planning standards for public health emergency preparedness have created an opportunity to rethink the collaborative approach to strategic planning. This thesis considers the role that collaborative strategic management and collaborative frameworks may play in strengthening strategic planning at the federal level through a policy options analysis. Considerations for implementation and recommendations moving forward are provided for both existing and new collaborations.

KEYWORDS: strategic planning, collaboration, strategic management, whole community planning, collaborative strategic management

CLARIFYING RESILIENCE IN THE CONTEXT OF HOMELAND SECURITY

Jerry T. Monier Jr.–Preparedness Section Chief, Louisiana-Governor's Office of Homeland Security and Emergency Preparedness, Baton Rouge, Louisiana
B.S., University of Phoenix, 2010
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Christopher Bellavita, Department of National Security Affairs
Second Reader: Philip J. Palin, Program Manager, Regional Catastrophic Preparedness Grant Program, Mid-Atlantic Supply Chain Resilience Project, Stanardsville, Virginia

The term *resilience* is frequently used in the context of homeland security. The definition continues to emerge within the evolving homeland security enterprise. The purpose of this thesis is to clarify the concept of resilience in the context of homeland security. Existing homeland security polices of the federal government of the United States were synthesized with resilience-based research obtained from various sciences. The synthesis of research and policy concluded that resilience is a process of adaptability influenced by complexity, interaction, and experience. In the homeland security context, resilience is a continual process of adaptation based on a variety of man-made, natural, and economic adversities. Resilience is a vision of homeland security rather than a policy of the enterprise. The homeland security practitioner's understanding of resilience is influenced through the clarification, introduction, and application of the concept. Developing a clear understanding of resilience is accomplished through the development of a resilience narrative for the enterprise, the introduction of the concept into new and existing training programs of the homeland security enterprise, and the application of the concept as an approach of the enterprise. The exploration of the homeland security enterprise at the academic and practitioner level requires a directional heading. The concept of resilience recommended by this thesis establishes a directional heading for the homeland security practitioner.

KEYWORDS: resilience, complexity, homeland security, whole community, adaptation, emergency management, disaster recovery, grants, training, complex adaptive systems of systems, psychological resilience

THE GENESIS OF TRANSFORMATION: THE RISE OF THE UNITED STATES ARMY'S MODULAR BRIGADE COMBAT TEAMS

Jason A. Pardee–Major, United States Army
B.A., State University of New York at Buffalo, January 2003
Master of Arts in Security Studies (Defense Decision-Making and Planning), March 2013
Advisor: James Russell, Department of National Security Affairs
Second Reader: Daniel Moran, Department of National Security Affairs

Beginning in 1999, the Army pursued a transformation effort that would span over a decade and produce a changed force structure that relied upon the brigade combat team as the service's focal conventional fighting force. Two decisions loomed large in the Army's direction away from the division as its combat force building block. This thesis examines both the decision to create the Stryker Brigade Combat Team as part of General Eric Shinseki's vision for Army transformation, and General Peter Schoomaker's decision in 2003 to focus change on the creation of a modular force. These decisions are investigated through three hypotheses that are based in military innovation theory. The hypotheses contend that the Army's decisions can be explained by either change in the security environment, by intervention on behalf of civilian leaders external to the service demanding change, or by innovative thinking and leadership by the Army's senior uniformed or civilian leaders. This thesis finds that elements of each hypothesis were present in each decision, but that the impact of the security environment appeared as a strong causal factor in the Army's movement toward modularization throughout the examination of the entire period.

KEYWORDS: United States Army transformation, innovation, Stryker Brigade Combat Team, modularization

ESTABLISHING A DERADICALIZATION/DISENGAGEMENT MODEL FOR AMERICA'S CORRECTIONAL FACILITIES: RECOMMENDATIONS FOR COUNTERING PRISON RADICALIZATION

Tony C. Parker–Assistant Commissioner of Prisons, Tennessee Department of Correction
BS, University of Tennessee, 1995
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Nadav Morag, Center for Homeland Defense and Security
Second Reader: Patrick Miller, Center for Homeland Defense and Security

Prison radicalization has been identified as a potentially significant threat to America's homeland security. When considering the inmate population currently housed within the Federal Bureau of Prisons with a terrorism nexus and the fact that 95 percent of our inmate population will return to our communities, the need for a proactive posture to prison radicalization becomes evident. Currently, the United States has no prison deradicalization program.

This thesis provides a comparative analysis of two deradicalization/disengagement programs currently utilized in Singapore and Saudi Arabia. The analysis identifies externally valid data that provides the basis for recommendations for United States correctional policymakers in building a framework for a United States prison deradicalization model. This thesis also examines the current literature, relevant to prison radicalization and the prison environment that may promote prison radicalization. Through an analysis of these environmental elements, specific recommendations are made that attempt to counter the contributing factors within the prison environment that make the prison setting a fertile ground for radicalization.

KEYWORDS: prison, radicalization, deradicalization, disengagement, correctional, prisoner, extremism, corrections, incarcerated, counter terrorism, Tennessee Department of Correction

DOMESTIC TERRORISM: FIGHTING THE LOCAL THREAT WITH LOCAL ENFORCEMENT

Brett M. Ringo–Lieutenant, United States Navy
B.S., Maine Maritime Academy, April 2006
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Erik J. Dahl, Department of National Security Affairs
Second Reader: Rodrigo Nieto-Gomez, Department of National Security Affairs

Since 9/11, the NYPD has taken on what might be called a personal vendetta to never allow another terrorist attack to strike the citizens of New York City. It has developed a unique and controversial model that critics say consistently pushes the boundaries of the law and civil rights in an attempt to spy on and monitor the behavior of the residents of New York City in order to prevent another devastating attack.

New York City is not the only place affected by the threat of domestic terrorism. Other municipalities have realized this threat and have attempted to establish methods to prevent the occurrence of a similar scenario in their locales. Many municipalities have attempted to develop their own version of a counterterrorism defense using their own ideas and following those from the NYPD. However, the NYPD model has been criticized for encouraging racial profiling and violating citizens' civil liberties through their collection methods. This thesis suggests how other municipalities can utilize positive aspects of the NYPD model to deter and foil any future attempts to cause our nation harm.

KEYWORDS: domestic terrorism, law enforcement

DEVELOPING A BLUEPRINT FOR SUCCESSFUL PRIVATE PARTNERSHIP PROGRAMS IN SMALL FUSION CENTERS: KEY PROGRAM COMPONENTS AND SMART PRACTICES

Kenneth A. Rueben–Special Agent in Charge, Oregon Department of Justice
B.S., City University of Seattle, 2001
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Thesis Co-Advisor: Lauren Fernandez, Department of National Security Affairs
Thesis Co-Advisor: Kathleen Kiernan, Department of National Security Affairs

The *Baseline Capabilities for State and Major Urban Area Fusion Centers* required fusion centers to establish programs to interact with the private sector. These programs took the form of public and private sector outreach programs. This requirement had a profound budgetary and operational impact on fusion centers, but agencies received very little guidance about how to plan, organize, and sustain these programs.

The goal of this thesis was to identify smart practices and create an operational blueprint that fusion centers and intelligence units could use to establish a successful private sector outreach program. Three nationally recognized programs were studied and evaluated by a panel of subject matter experts. The group identified six fundamental components that executives should consider prior to establishing a program: determine if the host agency has the expertise to manage the program, assess the agency's culture to identify its willingness to interact with the business community, establish sustainable funding mechanisms prior to implementing the program, use a hybrid approach to communication including websites and face-to-face meetings, fully understand the value of the private sector, and emphasize the importance of participation by agency leadership.

READY FOR THE FUTURE: ASSESSING THE COLLABORATIVE CAPACITY OF STATE EMERGENCY MANAGEMENT AGENCIES

Jennifer Schaal, State Preparedness Assessment Program Manager,
Washington State Emergency Management Division
B.A., City University of Seattle, 1993
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Thesis Advisor: Susan Hocevar, Department of National Security Affairs
Second Reader: Ellen Gordon, Department of National Security Affairs

Emerging needs of the emergency-management discipline are outlined in recent presidential directives, national strategies, and federal emergency-management, strategic-initiative documents. Meeting these needs requires collaboration as a core capability. Collaboration with diverse communities, volunteers, and the private sector are essential, as are strategic and operational actions for collaborating, building social capital, and using social media for collaboration. The future of our nation's resilience to disasters depends on a collaborative network of partners that reaches from the Federal Emergency Management Agency to individual citizens and the communities they inhabit.

State emergency-management agencies are the hub of this network and must lead the effort to effectively collaborate at all levels. The research findings of this thesis show that state emergency-management organizations have not yet fully developed the collaborative capacities necessary to meet emerging needs. In addition, data shows that organizational structures of state emergency-management organizations are impacting collaborative capacity development. In particular, military-based organizations lag behind their civilian-based counterparts in every area of collaborative capacity building. Reasons for these differences, and research into more effective structural models, should be explored.

KEYWORDS: collaboration, collaborative capacity, state government, emergency management, homeland security, preparedness, prevention, social capital, whole community, social media

FADED COLORS: FROM THE HOMELAND SECURITY ADVISORY SYSTEM TO THE NATIONAL TERRORISM ADVISORY SYSTEM

Vincent H. Sharp–Operations Evaluation Analyst, ARNORTH/ Civil Support Readiness Group-West, San Antonio, Texas
B.S., United States Air Force Academy, 1977
M.S., University of Arkansas, 1987
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Robert Simeral, Center for Homeland Defense and Security
Second Reader: John Rollins, Center for Homeland Defense and Security

After the events of 9/11, Homeland Security Presidential Directive-3 (HSPD-3) established the Homeland Security Advisory System (HSAS) to provide a comprehensive and effective means to disseminate information regarding the risk of terrorist acts to federal, state, and local authorities and the American people. Under HSAS, threat levels were raised or lowered 16 times, but never below threat level yellow (elevated condition). HSAS should have been straightforward and easy to understand. What evolved was confusion over alerts, lack of specific threat information, concerns over costs to institute and maintain protective measures, and questions regarding what was expected of citizens. Government agencies, the private sector, and the general population became immune with the threat level remaining at or above yellow.

HSAS was woefully misunderstood, not just by the general population but also within federal, state, and local governments. Ridiculed by comedians, HSAS gradually began to disappear, to the point it was necessary to search for the current threat level, whereas it had once been prominently posted. The purpose of this thesis is to review HSAS and the associated problems, to look at comparable international systems, to present an alternative recommendation to provide timely and informative warnings of terrorist threats, and to restore credibility by merging HSAS with the already existing DOD force-protection conditions.

KEYWORDS: homeland, security, advisory, system, national, terrorism, threat, alert, terrorist, warnings

FEDERALISM IN NEPAL: DIVERGENT PERCEPTION AND CONVERGENT REQUIREMENTS FOR DEMOCRATIC CONSOLIDATION

Narayan Silwal–Lieutenant Colonel, Nepal Army
M. Sc., University of Madras, April 2008
Master of Arts in Security Studies (Civil–Military Relations), March 2013
Advisor: Thomas C. Bruneau, Department of National Security Affairs
Co-Advisor: Anshu Chatterjee, Department of National Security Affairs

Democratization, decentralization, ethnic identity, federalism, rights of indigenous people, and politics of consensus are often-used terms in the contemporary political debate in Nepal. Despite political consensus on federalism as the founding notion of the Interim Constitution (2007), political parties within the Constituent Assembly have failed to forge a consensus on the nature of federalism. This thesis analyzes the complexity of politics in multi-ethnic societies and specifically, the rise of ethnic politics and the federalism agenda of political parties in Nepal. The lack of ethnic-specific regions makes the identity issue more complex given that the Maoist platform promised ethnic-specific regions in the country upon coming to power. The issue was made more complicated due to complex geopolitics, inter- and intra-party squabbles for power, and unhealthy party competition for political benefits and attention.

This thesis also suggests that the solution to state-restructuring rests on the political parties and their commitment to democratic procedures because federalization and democratization of the state are mutually supportive, a lesson learned from India and Spain. Only political understanding at the highest possible levels and a compromise of political interests putting the people and national agenda at the center can solve the present

political impasse revolving around federalism.

KEYWORDS: federalism, multi-ethnic society, state restructure, constituent assembly, discrimination, caste, ethnic identity, Maoist, Nepal, federalization, democratization, people's movement, interim constitution.

BEING SOCIAL: INTEGRATING SOCIAL MEDIA INTO PUBLIC INFORMATION SUPPORT TO EMERGENCY RESPONSE #SMEM

Tamara L. Spicer–Major, State Public Affairs Officer, Missouri National Guard
B.A., Missouri Southern State University, 1998
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Co-Advisor: John Rollins, Center for Homeland Defense and Security
Co-Advisor: Rodrigo Nieto-Gomez, Center for Homeland Defense and Security

Emergency response agencies across the homeland security spectrum rely on their public information offices to leverage social media in support of citizens and response organizations during times of disaster. Do these public information practitioners have the guidance and tools necessary to represent their organizations effectively in times of emergency?

To answer this question, this thesis reviews social media policies at the local, state, federal, and international emergency-response agency-levels, specifically looking at guidance provided for crisis communications' social media use during and after a disaster. Case studies on the how social media are used during and after a disaster are studied from the various perspectives. Finally, this research examines additional considerations for social media and emergency response.

The policy review and case studies find a disparity between what is expected of our emergency response agency communicators and the guidance provided to them to meet the needs of our citizens and organizations in a time of disaster. This gap between policy and action leaves room for miscommunication and inconsistencies that must be addressed.

This thesis concludes with research analysis, addressing that information gap, and provides a policy template for normal conditions and emergency response events.

KEYWORDS: social media, public information, emergency response, crisis communications, disaster response, Web 2.0, social network, best practices for social media, Ushahidi, crowdsourcing, tweet, blog

ON A CLEAR DAY, YOU CAN SEE ICS: THE DYING ART OF INCIDENT COMMAND AND THE NORMAL ACCIDENT OF NIMS—A POLICY ANALYSIS

Andrew C. Teeter–District Chief, Tulsa Fire Department
B.S., Oklahoma State University, Stillwater, Oklahoma, 1994
Master of Arts in Security Studies (Homeland Defense and Security), March 2013
Co-Advisor: David Brannan, Department of National Security Affairs
Co-Advisor: Pat Miller, Department of National Security Affairs

One basic expectation that citizens have of government is to restore order in the face of devastation. With each catastrophic incident, politicians and administrators step under the public microscope as they attempt to bring order out of chaos. Failure to perform such a basic governmental function subjects officials and agencies to immense scrutiny with personal and organizational repercussions. In the quest for the answers to "What can be done better next time?" and "How do we prevent this from happening again?" elected officials and bureaucrats seek various policies. A recent example of this is the National Incident Management System (NIMS). NIMS is a fusion of incident command systems (ICSes) and broad governmental policy aimed at providing a systematic response to incidents. The fact that NIMS became policy was quite possibly a predictable event in an incremental series of events that began in the early 1970s. This thesis reveals how these predictable and incremental efforts have pushed our national frameworks into an increasing state of complexity with the po-

tential of catastrophic failure. Furthermore, this thesis recommends ways that will harvest success in the face of a catastrophic or disastrous incident without increasing complexity.

KEYWORDS: TERMS: incident command system, national incident management system, catastrophic incident, disaster, initial stages, self-organizing systems, self-organized criticality, complexity, unified command

THE EMERGING PATTERN OF CIVIL–MILITARY RELATIONS IN ISLAMIST STATES

R. Alexander Tuininga–Lieutenant, United States Navy
B.A., University of California, Berkeley, December 2005
Master of Arts in Security Studies, March 2013
Advisor: Robert Springborg, Department of National Security Affairs
Second Reader: Thomas Bruneau, Department of National Security Affairs

The rise of political Islam in the Muslim Middle East is a critical development certain to shape political and social change in the region for decades to come. Political Islam is bound to exert a particularly strong influence on civil–military relations due to the legacy of military dominance of state institutions. Drawing on the reform experiences in Iran, Turkey, and Egypt, this thesis argues that a distinct pattern of civil–military relations is beginning to emerge in which Islamist governments rely on ideology to mobilize and ensure the loyalty of supporters to a degree that clearly distinguishes themselves from their authoritarian and democratic predecessors. While these Islamist-dominated governments have utilized some democratic control mechanisms in their efforts to expand their control of the government and bring the military under civilian control, this owes more to expediency than to a genuine commitment to democratic reform. Although each Islamist political organization interprets the Islamization of the state differently, and some could be considered politically or socially liberal, the primary characteristic of any Islamist political organization is to Islamize the state rather than to democratize it—a characteristic that has important implications for how Islamist governments assert their authority over the military.

KEYWORDS: Iran, Turkey, Egypt, civil–military relations, CMR, Islam, Islamist, Arab Spring, transition, revolution, democracy, democratization, police, security, security sector reform, intelligence

CIVIL–MILTARY RELATIONS IN TURKEY: MOTIVES BEHIND THE SHIFT OF POWER FROM MILITARY TO CIVILIANS AFTER THE INTERVENTIONS

Mustafa S. Uygun–1st Lt., Turkish Army
B.S., Turkish Military Academy, August 2004
Master of Arts in Security Studies (Civil–Military Relations), March 2013
Advisor: Robert Looney, Department of National Security Affairs
Second Reader: Scott Jasper, Department of National Security Affairs

The Turkish military, the most trusted institution in the country for decades, has been a symbol of modernization and secularism since independence of the republic in 1923. Especially with the introduction of the multi-party system after the Second World War, the Turkish military's role became conspicuous by military interventions. Turkey witnessed 1960, 1971, 1980, 1997, and 2007 military interventions, each with a different character. However, instead of grasping the civilian authority for decades, the Turkish military elite tried to stay behind the curtains and pass on the governance to the civilians. Turkey was under direct control of the military only from 1960–62 and 1980–83. Especially in the last decade, the change in civil–military relations aroused a scholarly debate over the role of the military in civilian authority. This thesis examines the military interventions in order to define the attitudes of the military elite, by focusing on the reasons of the fast shift of power from military to civilian. This thesis argues that the delegation of power from the military to civilians is

mainly due to the harsh isolation of officer corps from politics, democratic incentives in terms of modernization, and economic and institutional developments.

KEYWORDS: Turkish military, civil–military relations, Turkish Army, Turkish civil–military relations

PREVENTING SCHOOL SHOOTINGS: A PUBLIC HEALTH APPROACH TO GUN VIOLENCE

Edward J. Welch, Director–Port Authority of New York and New Jersey
B.S., Arizona State University, 1978
M.A., City University of New York, 1992
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Co-Advisor: Fathali M. Moghaddam, Department of National Security Affairs
Co-Advisor: Paul J. Smith, Department of National Security Affairs

Gun violence in America must be addressed at the highest levels of society. Newtown, Aurora, and Virginia Tech were attacks on the very fabric of America. School shootings represent attacks on our nation's future. A public health approach to gun violence focuses on prevention. Public safety professionals, educators, and community leaders are squandering opportunities to prevent horrific acts of extreme violence. Preparedness is derived from planning, which is critical to mobilizing resources when needed. Rational public policy can work. Sensible gun legislation, which is accessible through a public-health approach to gun violence, neither marginalizes nor stigmatizes any one group. University administrators must fully engage the entire arsenal of resources available to confront this pernicious threat. The academic community can create powerful networks for research, collaboration, and information sharing. These collective learning environments are investments in the knowledge economy. In order for the police to remain relevant, they must actively engage the communities they serve by developing the operational art necessary to cultivate knowledge, relationships, and expertise. Police departments must emphasize strategies that improve performance. Police officers must understand the mission and meaning of "to protect and serve" and the consequences of public safety, which often come at their personal peril. Gun violence in America is a public health epidemic, and preventing it requires collective responsibility.

KEYWORDS: public health, school shootings, violence prevention, gun violence, college and university violence, gun control, firearm safety, active shooter, police response, mental health, police training, extreme violence

THE ROAD LESS TRAVELED: EXPLORING THE EXPERIENCES AND SUCCESSES OF WOMEN LEADERS IN HOMELAND SECURITY

Jonna West–Special Projects Manager, Georgia Emergency Management Agency, Homeland Security, Atlanta, Georgia
B.S., Georgia State University, 1997
Master of Arts in Security Studies (Homeland Security and Defense), March 2013
Advisor: Kathleen Kiernan, Center for Homeland Defense and Security
Second Reader: Christopher Bellavita, National Security Affairs

Today, women constitute over 50 percent of the United States' population, yet they are still a minority in many workforce fields, including homeland security. A woman currently leads the U.S. Department of Homeland Security, and women have achieved high levels of leadership within the federal homeland security apparatus. While great strides are being made, women are still clearly the minority and hold an average of 20 percent of leadership positions in homeland security related professions such as law enforcement, fire, and emergency management. These numbers do not reflect the success that women who achieve leadership positions in the homeland security profession experience. Qualitative research was conducted through personal interviews

with 14 women who currently hold, or have previously held, top leadership positions in federal, state, or local agencies with homeland security responsibilities. Data gathered from these interviews shows that women are succeeding in homeland security leadership positions due to various factors including experience, education, the influence of strong mentors and role models, personality traits like tenacity and confidence, having vision, and their ability to overcome obstacles and take advantage of opportunities available to them.

KEYWORDS: leaders, leadership, workforce, women, gender, grounded theory, diversity, mentoring, role models

ENGAGING MILITARY IN POST-WAR RECONCILIATION: A CASE STUDY OF IMPLICATIONS FOR THE CONSOLIDATION OF DEMOCRACY IN SRI LANKA

Chaminda Wickramaratne–Wing Commander, Sri Lanka Air Force RWP
MDS., University of Kelaniya, 2010, psc
Master of Arts in Security Studies (Civil–Military Relations), March 2013
Advisor: Thomas C. Bruneau, Department of National Security Affairs
Co-Advisor: Florina Cristiana Matei, Centre for Civil–Military Relations

"Engaging Military in Post War Reconciliation: A Case Study of Implications for the Consolidation of Democracy in Sri Lanka" was prompted by post-war developments in Sri Lanka related to civil–military relations. The longest fought civil war in Southeast Asia came to an end when the Sri Lankan armed forces successfully defeated the Liberation Tigers of Tamil Eelam (LTTE) militarily in May 2009.

The huge success achieved by the Sri Lankan military vis-à-vis the Tamil Tigers has made the government rely on the country's military even after the defeat of the LTTE. In that context, the government has encouraged military presence in all possible areas of the driving mechanism of the country. Specifically, the government has engaged the military in many activities of national development and reconciliation, and in this scenario, there are many questions raised against the government of Sri Lanka and the military. Is excessive military involvement in civilian work leading to enhanced military prerogatives of Sri Lanka's armed forces, which in turn jeopardize civilian supremacy over the armed forces? Is involvement of the military in activities of national development and reconciliation endangering or boosting democratic consolidation in Sri Lanka?

Some critiques argue that Sri Lanka has undergone an excessive militarization, which is hindering post-war democratic consolidation. In this context, this research will look at civil–military relations adopted by the Sri Lankan government after the civil-war period, from the perspective of the military prerogatives highlighted by Alfred Stepan, and will further seek to identify the impact of CMR on the consolidation of democracy in the dilemma of militarization. It will start with a discussion of relevant theories of democratic transition and consolidation of CMR, followed by a discussion of democratic transition and consolidation in Sri Lanka, CMR during and after the civil war, and the ways CMR impacted democratic consolidation. The thesis finishes with an examination of lessons learned as well as best and worst practices of CMR.

KEYWORDS: civil–military relations, government of Sri Lanka, ministry of defense, Sri Lankan military, reconciliation and reconstruction, democratic control of civil military relations, post-war, armed forces of Sri Lanka, democratic transition, democratic consolidation, military prerogatives, post-war roles and missions

HIDDEN THREATS: REFRAMING THE DEBATE ON DOMESTIC INTELLIGENCE IN AN AGE OF COUNTERTERRORISM

Christopher E. Wright–Foreign Service Officer, U.S. Department of State
B.S., Truman State University, 1997
Master of Arts in Security Studies (Combating Terrorism: Policy and Strategy), March 2013
Advisor: Maria J. Rasmussen, Department of National Security Affairs
Second Reader: Randy P. Burkett, Department of National Security Affair

The attacks of September 11, 2001, revealed a weakness in America's defense—it lacked sufficient predictive domestic intelligence to prevent terrorism. More than a decade later, the American policy community continues to debate the need for an independent domestic intelligence service focused on counterterrorism. Debate often centers on whether or not the United States should create an intelligence service independent of the Federal Bureau of Investigation. It has given less attention to what characteristics are expected in a service if one were created. The questions of should and what are naturally intertwined. The former, however, often focuses on system-based factors exogenous to the service: administrative structures, oversight mechanisms, information-sharing bodies, and national legal frameworks. Generally absent from this debate is an isolated, systematic, evaluation of ideal characteristics endogenous to a domestic intelligence service. With a decade of reflection behind us, reframing the debate may help inform discussion on counterterrorism intelligence in America—so we may understand not only what we lack, but also what we should seek.

Through an evaluation of literature on intelligence in democratic nations, and application of this evaluation to the post-9/11 discourse, this thesis identifies and analyzes characteristics deemed "ideal" in a service. It then tests these ideals in foreign security services often touted as models for America in order to determine in what manner these characteristics exist, if at all. The study concludes by exploring lessons from this analysis to further inform debate, suggesting that the ideal characteristics expected in a domestic intelligence service are not only difficult to achieve in the modern counterterrorism environment, but a strict pursuit of them may also produce counterproductive results.

KEYWORDS: ASIO, Australian Federal Police, Australian Security Intelligence Organisation, British Security Service, BSS, counterterrorism, domestic intelligence, FBI, Federal Bureau of Investigation, intelligence, intelligence and democracy, intelligence reform, homeland defense, homeland security, Metropolitan Police Special Branch, MI5, national security, U.S. intelligence, U.S. security policy

MASTER OF BUSINESS ADMINISTRATION

IMPACT OF RETIREMENT CHOICES OF EARLY CAREER MARINES: A CHOICE ANALYSIS MODEL

André G. La Taste–Captain, United States Marine Corps
B.A., Chapman University, 2005
Master of Business Administration, June 2013
Aaron J. Masaitis–Captain, United States Marine Corps
B.S., University of South Florida, 2007
Master of Business Administration, March 2013
Lead Advisor: Mike Dixon, Department of Operations Management
Support Advisor: Wythe Davis, Department of Financial Management

This thesis analyzes the potential impact to Marine Corps junior officer/enlisted retention if changes are implemented to the military compensation package. The research was conducted using a discrete choice analysis methodology that is often used to differentiate factors that lead to decisions. Using an online survey, we asked both officers and enlisted Marines to make choices between a series of questions based on career benefits and compensation packages.

Each participant in the volunteer study was asked to make choices between several sets of career benefits and compensation packages, and utility data was derived from those choices. Through the use of multi-nominal logistic regression, we identified the level of impact on retention decisions after the subjects chose differing attributes of a compensation package that included retirement alternatives. Once data was collected through the survey, we were able to determine the retention impact of different retirement alternatives with a certain level of confidence within all of our segments.

KEYWORDS: discrete choice analysis, decision support matrix, compensation factors and attributes, retirement analysis of alternatives

CONTINGENCY CONTRACTING OFFICER PROFICIENCY ASSESSMENT TEST DEVELOPMENT FOR CONSTRUCTION, ARCHITECT-ENGINEER, AND CONTINGENCY CONTRACTING

Thomas Lutz–Major, United States Army
B.S., University of Dayton, Ohio, 1998
Michael Garrett–Captain, United States Army
B.S., Excelsior University, 2007
William Hunt–Lieutenant, United States Navy
B.A., Farleigh Dickinson University, 2002
Master of Business Administration, March 2013
Lead Advisor: Rene Rendon, Graduate School of Business and Public Policy
Support Advisor: Janie Maddox, Graduate School of Business and Public Policy

In September 2011, the U.S. Army Corps of Engineers (USACE) published a proficiency training guide entitled *51C/1102 Proficiency Guide for Construction, Architect-Engineer, & Contingency Contracting* for military contingency contracting officers (MCCOs) and 1102 interns within USACE. The training guide groups contracting tasks into four subject areas encompassing 45 separate contracting tasks in all. The research team of this report

supplemented the USACE training by providing a proficiency assessment test (PAT) based on the *51C/1102 Proficiency Guide* to assist mentors of MCCOs and 1102 interns with a tool for standardizing a way for them to demonstrate proficiency of individual tasks. Objectives of the project include the development and implementation of a pilot PAT of select contracting tasks followed by a comprehensive written proficiency assessment test used as a tool to measure proficiency for each of the 45 individual tasks. The research team vetted questions through experienced USACE MCCOs and subject matter experts. Furthermore, these experts assisted the team by providing valuable feedback from participating in the pilot PAT. After incorporating feedback from the sponsor, the research team provided USACE a final PAT that encompassed nearly 800 questions to measure proficiency of the 45 individual tasks.

KEYWORDS: U.S. Army Corps of Engineers, USACE, construction contracting, proficiency assessment test, SMCT, 51C, 1102, Soldier's Manual of Common Tasks, contracting, training, EP-715-1-8

MOBILE DEVICE MANAGEMENT IN THE DOD ENTERPRISE NETWORK: FACTORS FOR RISK MANAGEMENT, INTEGRATION, AND IT ACQUISITION

Donald E. Pratt Jr.–Major, United States Army
B.B.A., Texas Christian University, May 2003
Master of Business Administration, June 2013
Brian K. Jones–Major, United States Army
B.S., East Tennessee State University, May 2000
Master of Science in Information Technology Management, March 2013
Advisor: Glenn Cook, Department of Information Sciences
Co-Advisor: Brad Naegle, Graduate School of Business and Public Policy
Third Reader: Douglas Brinkley, Graduate School of Business and Public Policy

The Office of the Department of Defense Chief Information Officer (DOD CIO) has developed a mobile device strategy that will require the acquisition process of the DOD's information technology (IT) system to acquire a mobile device management (MDM) toolset to mitigate information assurance (IA) risks created through the use of mobile devices on the enterprise domain. In an effort to target affordability and control cost growth, IT professionals need to understand how IA concerns are addressed through MDM and how properly scoped solutions can be sourced to reduce project risks related to cost, schedule, and performance for projects that involve obtaining an MDM toolset through the DOD acquisition process.

This research develops a mixed method study to understand the concerns of federal information technology professionals who are knowledgeable about MDM and the acquisition professionals who procure the MDM solutions. In this research, the authors provide DOD professionals with a framework to select optimal MDM solutions through the identification of baseline requirements in order to operate effectively in a resource-constrained environment.

KEYWORDS: mobile device management, MDM, mobile device security, information assurance, IA, information technology management, ITM, cost effectiveness analysis, CEA, enterprise architecture

ASSESSING THE MARINE CORPS MENTORSHIP PROGRAM: PLANNED VS. ACTUAL USE AND PERCEIVED EFFECTIVENESS

Douglass L. Rauschelbach–Captain, United States Marine Corps
B.A., Stephen F. Austin State University, December 2004
Master of Business Administration, March 2013
Advisor: Kathryn Aten, Graduate School of Business and Public Policy
Second Advisor: Marco DiRenzo, Graduate School of Business and Public Policy

This research describes and assesses the Marine Corps Mentorship Program (MCMP). The MCMP is meant to help shape future leaders, increase unit cohesion, reinforce solidarity, foster relationships of genuine concern, and better prepare Marines to handle the increased challenges of today's operational climate. This research documents the motivation, goals, and implementation plan of the program and assesses the extent to which the actual implementation is consistent with the plan. It examines how extensively the program is used and also examines mentors' and protégés' assessments of the program. These data are used to compare planned versus actual MCMP implementation and perceived effectiveness in order to make recommendations for improving identified shortcomings.

KEYWORDS: Marine Corps Mentoring Program (MCMP), mentoring, mentors, protégés

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF SCIENCE

Applied Mathematics
Computer Science
Cyber Systems and Operations
Defense Analysis
Electrical Engineering
Human Systems Integration
Information Systems and Operations
Information Technology Management
Management
Mechanical Engineering
Meteorology
Meteorology and Physical Oceanography
Modeling, Virtual Environments, and Simulation
Operations Research
Physical Oceanography
Program Management
Remote Sensing Intelligence
Space Systems Operations
Systems Engineering

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF SCIENCE
IN
APPLIED MATHEMATICS

OPTIMIZATION OF ELECTROMAGNETIC WAVE PROPAGATION THROUGH A HETEROGENEOUS LIQUID CRYSTAL LAYER

Michael A. Winslow–Lieutenant, United States Navy
B.S., University of Arizona, December 2005
Master of Science in Applied Mathematics, March 2013
Advisor: Hong Zhou, Department of Applied Mathematics
Second Reader: Wei Kang, Department of Applied Mathematics

Advances in technology have given way to concepts in warfare that were once constrained to the world of science fiction. In an effort to stay ahead of any potential adversary's weapons development, we must look down the path of countermeasures to high-energy electromagnetic weapons.

In the attempt to engineer a material that can reduce transmitted beam intensity by the greatest factor, we look to liquid crystals. They have great potential to provide a starting point to engineer a material in order to show increased protection of DOD assets from high-energy beam weapons.

We first developed one-dimensional, finite-difference, time-domain codes to solve Maxwell's equations in order to model the electromagnetic wave propagation in a liquid crystal layer. After validating numerical results with analytical results for matched anchoring, we investigated the heterogeneous liquid crystal structures with mismatched anchoring conditions and determined the best anchoring conditions to minimize transmitted beam intensity. The main result of the simulation was that for a known incident wave, the maximum reduction of the transmitted intensity was achieved with matched anchoring conditions. However, for mixed anchoring conditions, there was evidence that the mixed structure can reduce the intensity for a wider range of waves.

KEYWORDS: electromagnetic wave propagation, liquid crystal polymer, finite-difference time-domain code

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF SCIENCE IN COMPUTER SCIENCE

SPECIFICATION, VALIDATION AND VERIFICATION OF MOBILE APPLICATION BEHAVIOR

Christopher B. Bonine–Lieutenant, United States Navy
B.S., Southern Polytechnic State University, December 2002
Master of Science in Computer Science, March 2013
Advisor: Man-Tak Shing, Department of Computer Science
Co-Advisor: Thomas W. Otani, Department of Computer Science

Mobile devices have, in many ways, replaced traditional desktops in usability, usefulness, and availability. Improvements to computational power, battery life, device capabilities, and user experience will continue to drive people to stop using desktops and solely use mobile devices. Applications are vital to maximize usefulness of these devices. Development of these applications proceeds with a rapidity that surpasses the development pace of the devices themselves.

Current methods are inadequate when attempting to verify and validate the behavior of the applications to ensure they perform correctly as the customers expect and with respect to the software specifications. The current V&V methods are limited to environments that do not reflect the typical operational environment for mobile devices. These methods lead to false beliefs that the results of V&V tests prove correctness of the software, when they are only proving that the software works in a non-mobile environment.

To solve this problem, we propose that application log files be used to capture the execution behavior while operating in their typical environment. The log files along with customer requirements, represented formally as statechart assertions, will provide a mechanism to conduct automated V&V on the behavior of the application while operating in its planned, mobile environment.

KEYWORDS: statecharts, statechart assertions, software, verification, validation, mobile device application

SECURITY ISSUES AND RESULTING SECURITY POLICIES FOR MOBILE DEVICES

Jason L. Brooks–Civilian, Department of the Navy
B.S., University of South Carolina, 2000
Jason A. Goss–Civilian, Department of the Navy
B.S., East Stroudsburg University, 2006
Master of Science in Computer Science, March 2013
Advisor: George Dinolt, Department of Computer Science
Second Reader: John Mildner, SSC-LANT

Mobile devices, given their promise of mobility with rich functionality, are being deployed with broadening use cases throughout the United States Department of Defense. All the while, massive quantities of information are stored and accessed by these devices without there being a comprehensive and specialized security policy dedicated to protecting that information. The importance of having a security policy grows as these devices start providing new capabilities and replacing many information systems we currently have deployed. Since the same device will be used in many different contexts, each with potentially different security policies, the devices will have to be able to adapt to those contexts. The security policies enforced by the device will have to adapt accordingly.

We investigate potential mobile-computing security policies to balance this request for context-aware functionality with the information assurance required of these government devices. We investigate the security issues raised in the use of these devices and provide example security policies that address some of these issues.

KEYWORDS: cybersecurity, mobile devices, mobile phone, context aware security policy, security policy, mobile security policy

A TOOL FOR STATEFUL REPLAY

Thomas S. Le Vier–Lieutenant, United States Navy
B.S., Rochester Institute of Technology, 2007
Master of Science in Computer Science, March 2013
Advisor: Geoffrey G. Xie, Department of Computer Science
Co-Advisor: John H. Gibson, Department of Computer Science

The Marine Corps Tactical System Support Agency (MCTSSA) at Marine Corps Base (MCB) Camp Pendleton is currently conducting evaluation of wide area network (WAN) optimization products. MCTSSA has requested a tool that will conduct stateful TCP replay on large network trace files.

This thesis lays the groundwork and establishes a framework for the development of a testing capability for measuring the efficiency of different WAN optimization products with respect to an excerpt of real-world production TCP flows. It also creates a software tool that will re-create the exchange of data between two hosts from a network trace file and maintain the relative ordering of TCP packets and their payload. In addition, the software eliminates retransmissions that would not occur with the deployment of WAN optimization gateways.

KEYWORDS: TCP; wide area network; TCP replay; stateful replay; optimization

MALWEBID–AUTODETECTION AND IDENTIFICATION OF MALICIOUS WEB HOSTS THROUGH LIVE TRAFFIC ANALYSIS

Tony Nichols–Lieutenant Commander, United States Navy
B.S., University of Phoenix, 2005
Master of Science in Computer Science, March 2013
Advisor: Robert Beverly, Department of Computer Science
Co-Advisor: Geoffrey Xie, Department of Computer Science

This thesis investigates the ability for recently devised packet-level Transmission Control Protocol (TCP) transport classifiers to discover abusive traffic flows, especially those not found via traditional methods, e.g., signatures and real-time blocklists.

Transport classification is designed to identify hosts considered to be part of abusive infrastructure without deep packet inspection. A particular focus is to understand the applicability of such methods to live, real-world network traffic obtained from the Naval Postgraduate School campus enterprise network.

This research evaluates both how consistent and how complimentary transport traffic classification is with known block lists. In particular, the system has a 97.8% average accuracy with respect to blocklist ground-truth, while correctly identifying 94% of flows to abusive hosts unknown to the blocklists as verified through manual sampling.

KEYWORDS: network security, malicious activity, abusive infrastructure

THE VIABILITY OF A DTN SYSTEM FOR CURRENT MILITARY APPLICATION

Todd J. Sehl–Lieutenant Commander, United States Navy
B.A., Norwich University, June 2002
Master of Science in Computer Science, March 2013
Advisor: Geoffrey G. Xie, Department of Computer Science
Co-Advisor: Justin P. Rohrer, Department of Computer Science

With disruption-tolerant networking (DTN) technology in development, we see the DARPA program and the DTN research group making significant strides toward DTN infrastructure. Mobile ad-hoc networks are a topic of interest in the military today due to the flexibility of the network to expand and contract continuously and remain consistent in a rapidly changing environment. The primary research question in this thesis is whether the SPINDLE disruption-tolerant networking software is viable for field deployment in the United States Marine Corps. My research evaluates the usability of the BBN SPINDLE BPA for deployment. In this paper, I discuss what is required to learn, install, and configure the BBN software while evaluating how stable the software performs. I explore the question of whether it is feasible to add an ICMP notification service for applications whose traffic has been diverted due to the DTN process. The tests conducted demonstrate two possible methods to use ICMP messages in a network to convey unique DTN messages to individual hosts. They also demonstrate how a known ICMP message type can be utilized to carry message flags representing explicit network disruption notifications in applications designed to recognize them.

KEYWORDS: DTN, delay-tolerant network, disruption-tolerant network, SPINDLE, networks, BBN, Raytheon

TELECOMMUNICATIONS POLICY IN THE CARIBBEAN: A CASE STUDY OF TELECOMMUNICATIONS IN JAMAICA AND CUBA

Robert A. Yee–Lieutenant Commander, United States Navy
B.S., Chapman University, December 1994
Master of Science in Computer Science, March 2013
Advisor: Bert Lundy, Department of Computer Science
Second Reader: Gurminder Singh, Department of Computer Science

Government influence and direction over a country's telecommunications infrastructure is determined by policies and regulations designed to provide oversight for how a telecom company should conduct business within the country. While these policies and regulations can range from extremely liberal to authoritarian, a nation's ideology will dictate how its government interacts with telecommunications providers and, ultimately, how the telecommunications companies can become a viable entity for economic growth. Vast opportunities within the Latin American and Caribbean region exist for telecommunications investors willing to tackle these complex government ideologies.

This thesis explores the Caribbean countries of Jamaica and Cuba—where telecommunications has developed in different ways based on government involvement in the telecom market—and the policies and regulations designed to foster competition, or lack thereof.

A detailed analysis into political, business, and foreign influence shows that Jamaica and Cuba can benefit directly from private investors willing to venture into these countries. A comparison reveals that policy enforcement affects the balance in relationship between government oversight, telecommunications business investors, consumers, and the economy. Recommendations are provided for policy and regulatory enforcement/updates to better support privatization and liberalization of the telecommunications infrastructure of Cuba and Jamaica.

KEYWORDS: telecommunications, Jamaica, Cuba, policy, regulation, infrastructure, cellular, landline, internet, cable, Digicel, Claro, FLOW, LIME, ETECSA

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF SCIENCE IN CYBER SYSTEMS AND OPERATIONS

A DEFINITIVE INTEROPERABILITY TEST METHODOLOGY FOR THE MALICIOUS ACTIVITY SIMULATION TOOL

Nathaniel J. Hayes–Lieutenant, United States Navy
B.A., University of Washington, August 2008
Master of Science in Cyber Systems and Operations, March 2013
Thesis Advisor: Gurminder Singh, Department of Computer Science
Co-Advisor: John H. Gibson, Department of Computer Science

The threat of degradation or disruption from cyber infiltration, espionage, and theft to militarily and nationally critical information and network systems poses a significant challenge to the DOD and DON. To mitigate this challenge, network administrators must be trained to properly recognize and defend against malicious activity.

The Malicious Activity Simulation Tool (MAST), a software program under development at NPS, mimics the behavior and impact of network-based malware in an effort to train the administrators of operational DOD networks both to respond to the threats, such as materials present to their networks, and to assess their competence in recognizing and responding to such threats.

In order for MAST to achieve its potential as an acceptable assessment and training tool, it must first be shown to present no new threat to the environment for which it was designed. This thesis develops a step-by-step testing procedure, the execution of which will demonstrate that MAST can perform at a level commensurate with current criteria for operating securely on DOD networks.

Additionally, this thesis discusses the quantitative testing environment and current testing and implementation methods and criteria for new cyber hardware and software programs of record in the DOD.

KEYWORDS: malware, quantitative testing, computer network defense, simulation, network administrator training, cyberspace, cyber domain, cyber test range

THE LONG-TERM U.S. STRATEGIC IMPLICATIONS OF HUAWEI'S PENETRATION IN LATIN AMERICA

Nicholas C. O'Connor–Lieutenant, United States Navy
B.A., Virginia Military Institute, May 2006
Master of Science in Cyber Systems and Operations, March 2013
Advisor: Wade Huntley, Department of National Security Affairs
Second Reader: Linda Kalister, Contractor

In recent years, Huawei Technologies has become one of the most powerful telecommunication companies in the world. While it has been very successful, it has been surrounded by controversy. The United States has presented multiple accusations against Huawei; however, the supporting evidence is often lacking. This thesis examines the U.S. strategic implications of Huawei's expansion into Latin America. First, the U.S. economic impact of this expansion is examined. Next, the security concerns posed by Huawei and accusations of espionage, intellectual property infringement, and an inappropriate relationship with Iran are evaluated. These accusations are then evaluated for validity based on the evidence presented. Finally, these findings are summarized and multiple future recommendations for research and actions are presented. Since there is little

evidence to support many of the accusations against Huawei, it is essential to either find such evidence, or drop these claims.

KEYWORDS: Huawei, Latin America, U.S. security

A TECHNIQUE FOR PRESENTING A DECEPTIVE DYNAMIC NETWORK TOPOLOGY

Samuel T. Trassare–Lieutenant, United States Navy
B.S., San José State University, December 2005
Master of Science in Cyber Systems and Operations, March 2013
Advisor: Robert Beverly, Department of Computer Science
Second Reader: David Alderson, Department of Operations Research

Adversaries scan Department of Defense networks looking for vulnerabilities that allow surveillance or the embedding of destructive malware weapons. In cyberspace, adversaries either actively probe or passively observe defended computer networks in attempts to determine, among other attributes, the topology of the network. We developed a novel strategic deceptive methodology, based on principles of military deception, for deceiving a malicious traceroute probe in defense of a physical data communications network. We constructed a proof-of-concept network to show that a remote adversary who uses traceroute to map the defended network's topology can be presented with a false route of the defender's choosing. Akin to military deception operations in the field and at sea, a network that employs a deception scheme implemented on an intelligent border router can present a deceptive topology to an adversary. Our experiments showed that a defender using our technique can successfully deceive a traceroute probe, the first in a sequence of steps to mount a credible deception scheme against an adversary.

KEYWORDS: topological deception, military deception, traceroute, network defense

MASTER OF SCIENCE IN DEFENSE ANALYSIS

FIGHTING DARK NETWORKS: USING SOCIAL NETWORK ANALYSIS TO IMPLEMENT THE SPECIAL OPERATIONS TARGETING PROCESS FOR DIRECT AND INDIRECT APPROACHES

Matthew D. Erlacher–Major, United States Army
B.S., United States Military Academy, 1995
Master of Science in Defense Analysis, March 2013
Co-Advisor: Sean F. Everton, Department of Defense Analysis
Co-Advisor: Dorothy E. Denning, Department of Defense Analysis

Since the September 11, 2001, terrorist attacks, the United States military has been engaged against transnational networks, a domain for which many of its processes were not designed and are not well-suited. A significant part of the military's struggle of the last decade of war has been a lack of a framework for understanding and measuring changes in social networks, especially insurgent or terrorist networks known as dark networks. This thesis puts forth an experimental framework called the Special Operations Network Analysis Process, or SONAP, to solve that problem. SONAP combines the CARVER target analysis method with social network analysis and a systems framework for identifying and bounding social mechanisms that support dark networks, as well as a means for identifying and evaluating changes in networks. This framework is then applied to a 2006 open-source data set of an Indonesian terrorist network. The result is a demonstrated utility in not only understanding the structure of that dark network, but also in designing an intervention strategy, along with means to measure structural and operational changes in that network.

KEYWORDS: social network analysis, dark networks, special operations, irregular warfare, targeting, direct approach, indirect approach, terrorism, counterterrorism, counterinsurgency, pseudo operations, effects-based operations, effects-based thinking, systems thinking, social systems

THE SEEDS OF MOBILIZATION: EMOTIONAL FRAMES AND INFLUENCE

Benjamin L. Tipton–Major, United States Army
B.S., Longwood College, June 1999
Master of Science in Defense Analysis, March 2013
Advisor: Hy S. Rothstein, Department of Defense Analysis
Second Reader: Doowan Lee, Department of Defense Analysis

Why is the United States not highly effective at influencing the attitudes and opinions of foreign audiences? The constant and almost sole utilization of rational argumentative frames with almost no emotionally resonant appeal, for fear of offending foreign sensibilities, is the reason why. This study utilizes a survey research experiment to suggest that emotionally resonant messaging is more effective, and its use should not only be acceptable but requisite to both policy makers and public of the U.S. to influence foreign populations to the benefit of the U.S. and our allies.

KEYWORDS: psychological operations, influence, persuasion, coercion, mobilization, social movement theory, information, emotion, fear, hate

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF SCIENCE IN ELECTRICAL ENGINEERING

ENHANCED PRECISION GEOLOCATION IN 4G WIRELESS NETWORKS

Jason Q. McClintic–Lieutenant, United States Navy
B.A., University of Saint Thomas, May 2008
Master of Science in Electrical Engineering, March 2013
Advisor: Murali Tummala, Department of Electrical and Computer Engineering
Co-Advisor: John McEachen, Department of Electrical and Computer Engineering

The objective of this thesis is to improve the performance of geolocation schema through estimating the speed of light via the refractive index of air, estimating the target velocity, and exercising receiver choice. A method for incorporating the speed of light into geolocation models is proposed in this thesis. A generic receiver choice algorithm is proposed with application to time-of-arrival, time-difference-of-arrival, and Doppler velocity estimation schemes. An object-oriented MATLAB package was developed to describe the environment, network, target behavior, simulate data, and conduct simulation study. Simulation results show that using an incorrect estimate of propagation velocity, when timing information is sufficiently precise, can yield position estimates that are, on average, significantly less accurate and less precise. Furthermore, simulation results show inclusion of choice enables large improvements in both the average error and the dispersion of the errors.

KEYWORDS: geolocation, analysis of algorithms, time-of-arrival, time-difference-of-arrival, differential Doppler, refractive index

RESEARCH, DEVELOPMENT, AND TESTING OF A FAULT-TOLERANT FPGA-BASED SEQUENCER FOR CUBESAT LAUNCHING APPLICATIONS

Lucas S. Parobek–Lieutenant, United States Navy
B.S., The Citadel, May 2006
Master of Science in Electrical Engineering, March 2013
Co-Advisor: Herschel H. Loomis Jr., Department of Electrical and Computer Engineering
Co-Advisor: James H. Newman, Space Systems Academic Group

This thesis concerns various means of implementing fault tolerance in logic for use in a general payload processor design. The first specific application of this research is a sequencer developed for deploying CubeSats. The sequencer shall be capable of the timing and accurate deployment of multiple CubeSats from a host spacecraft and shall have the capability for quick reconfiguration prior to launch. This research considers a variety of hardware for suitability toward sequencer construction; field programmable gate arrays (FPGAs) are chosen as the primary device. The design further evolves to selection of the Actel ProASIC3 series of FPGAs. Initial logic test configurations are implemented on a development kit with analysis of results provided. Fault-tolerant techniques are compared with a set of experiments to determine optimum resource utilization and timing schemes. Triple modular redundancy (TMR) is selected as the technique for fault-tolerant logic implementation in the sequencer. Preliminary test boards are built via schematic design and printed circuit board layout. The manufacturing, integration and testing of the 'ProASIC3 Test Board' is fully discussed. A follow-on flight

prototype board is designed with more extensive hardware allowing for implementation of fault-tolerant techniques and future growth capability. Recommendations for future work are discussed.

KEYWORDS: single-event effect (SEE), single-event upset (SEU), multiple-bit upset (MBU), field programmable gate array (FPGA), fault tolerance, triple modular redundancy (TMR), quadruple force decide redundancy (QFDR), quadded logic, CubeSat, satellite, Altium, Actel, Microsemi, ProASIC3, Xilinx, Virtex

PEAK POWER CONTROL WITH AN ENERGY MANAGEMENT SYSTEM

Nathan J. Peck–Lieutenant, United States Navy
B.S., United States Naval Academy, May 2005
Master of Science in Electrical Engineering, March 2013
Advisor: Giovanna Oriti, Department of Electrical and Computer Engineering
Co-Advisor: Alexander L. Julian, Department of Electrical and Computer Engineering

The Department of Defense (DOD) is researching methods to enhance energy security and reduce energy costs. The energy security of DOD installations relies on the commercial electricity grid. One method being considered to improve energy security and reduce energy costs is the use of microgrids that include combinations of energy storage, energy sources, critical loads, and non-critical loads. A microgrid's power demand and the benefits of a microgrid integrated with a power electronics-enabled energy management system (EMS) is investigated in this thesis. The power demand of a single family household is analyzed. The peak power demand of the single family household displays the drawbacks of peak power demand on the commercial electricity grid and the installations receiving power from it. Drawbacks include reduced energy security due to blackouts and increased cost as a result of meeting the peak demand. One benefit of an EMS is its ability to island or continue supplying power to critical loads when the commercial electricity grid is lost. A second benefit is reduced power demand on the commercial electricity grid during peak power demand or on distributed resources (DR) while islanded by performing peak power control. The performance of peak power control by an EMS is demonstrated using a Simulink model and an experimental laboratory setup. The Simulink model and EMS functionality are validated with the laboratory experiments. The Simulink model is then used to demonstrate the reduction in peak power demand on the commercial electricity grid using an EMS on more complex loads such as motors and diode rectifiers. The Simulink model is also used to compare the power demand on the commercial electricity grid with and without the EMS.

KEYWORDS: energy management system, microgrid

TRAP CHARACTERIZATION IN HIGH-FIELD, HIGH-TEMPERATURE STRESSED GALLIUM NITRIDE HIGH-ELECTRON MOBILITY TRANSISTORS

Kevin B. Pham–Civilian, United States Air Force
B.S., University of Florida, May 2009
Master of Science in Electrical Engineering, March 2013
Advisor: Todd Weatherford, Department of Electrical and Computer Engineering
Second Reader: James Luscombe, Department of Physics

Gallium Nitride (GaN) high electron mobility transistors (HEMTs) offer higher power output over existing technology. However, issues such as current collapse and kink effect hinder GaN HEMTs performance. The degraded performance is linked to traps within the device. Capacitance-voltage (C-V) and current-voltage (I-V) measurements were performed on commercially available GaN-on-Si to characterize traps before and after

high-field, high-temperature stressed conditions. The results revealed the devices had less gate current leakage after stressing, and the C-V characteristics changed dramatically after a 24-hour recovery period.

KEYWORDS: capacitance-voltage, interface trap density, gallium nitride, GaN, high-electron mobility transistors

COMPARATIVE ANALYSES OF MULTI-PULSE, PHASE-CONTROLLED RECTIFIERS IN CONTINUOUS CONDUCTION MODE WITH A TWO-POLE LC OUTPUT FILTER FOR SURFACE SHIP DC APPLICATIONS

Kurt A. Young–Lieutenant Commander, United States Navy
B.S., University of Wisconsin-Platteville, May 2000
Master of Science in Electrical Engineering, March 2013
Advisor: Robert W. Ashton, Department of Electrical and Computer Engineering
Second Reader: Andrew Parker, Department of Electrical and Computer Engineering

The Navy of tomorrow will require a robust and reconfigurable power system capable of supplying power not only to large high-power propulsion loads but also to growing combat system loads like high-power radar and pulse loads in the form of rail guns and free-electron lasers. A critical component in such a system is the phase-controlled rectifier. As such, the issues associated with the inclusion of a power electronics rectifier need to be addressed. These issues include input alternating current (AC) interface requirements, the output direct current (DC) load profile, and overall stability in the presence of non-linear loads. Understanding these issues and determining the means of assuring compatibility with a Navy all-electric ship is the focus of this thesis.

By using a Simulink model of a variable parameter load, several multi-pulse count, high-power rectifiers were exercised. The Simulink results were compared to the analysis results of the linearized, small-signal transfer function.

These experiments led to the conclusion that increasing the pulse count and output filtering reduces the current distortion of the input interface. However, there are tradeoffs in terms of complexity and size of the passive components, and optimization based on source and load specifications is required.

KEYWORDS: phase-controlled rectifier, multiple pulse count, non-linear loads

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF SCIENCE
IN
HUMAN SYSTEMS INTEGRATION

THE EFFECTS OF SLEEP ON THE PERFORMANCE OF MARINES FOLLOWING EXPOSURE TO WATERBORNE MOTION

Cynthia Gelpi–Lieutenant, United States Navy
B.S., United States Naval Academy, May 2005
Master of Science in Human Systems Integration, March 2013
Advisor: Nita Lewis Shattuck, Department of Operations Research
Second Reader: Samuel E. Buttrey, Department of Operations Research

The transport of Marines and their equipment over potentially rough seas occurs often as part of assault landings. Seasickness can be disabling to troops taking part in assault landings. Significant gaps exist in our knowledge and understanding of the effects of waterborne motion on the combat performance of infantry personnel embarked aboard amphibious vehicles.

This study was part of the Habitability Assessment Test (HAT) and was driven by a need to determine whether sleep is related to the performance of Marines embarked on amphibious vehicles. Understanding the effect of sleep on performance enables the separation of sleep as a covariate in the evaluation of how motion affects Marines embarked on amphibious vehicles. The sleep and performance of 61 participants was observed during the course of a three-week testing period with multiple lengths of motion exposure. Performance measures were taken on various tests including marksmanship, obstacle course, and cognitive testing; in addition, a subjective questionnaire on motion sickness was administered. This study shows that sleep has a definite association with performance. Furthermore, this study uncovered a circadian effect that may have influenced the overall results of the HAT study.

KEYWORDS: sleep; fatigue; sleep debt; sleep deprivation; circadian rhythm; morningness-eveningness; sopite syndrome; actigraphy; sleep, activity, fatigue, and task effectiveness (SAFTE); fatigue avoidance scheduling tool (FAST); neuropsychological assessment metric (ANAM); amphibious operations

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF SCIENCE IN INFORMATION SYSTEMS AND OPERATIONS

PREDICTIVE FACTORS IN CONFLICT: ASSESSING THE LIKELIHOOD OF A PREEMPTIVE STRIKE BY ISRAEL ON IRAN USING A COMPUTER MODEL

Christopher K. de Angelis–Lieutenant, United States Navy
B.S., Villanova University, May 2006
Master of Science in Information Systems and Operations, March 2013
Advisor: Raymond R. Buettner Jr., Department of Information Sciences
Second Reader: Robert Springborg, Department of National Security Affairs

The ability to predict the likelihood of conflict between two states based primarily on extrinsic factors is an arduous task, particularly given the complicated nature of analysis required and the large number of input factors involved. However, the benefits that may be gained from such an evaluation could reveal valuable insights for a decision-maker if seemingly small factors exhibit a large impact on a state's prospect or ability to take action. A software model can be used to address the problem of aggregating and analyzing the information available to make a graphical model that facilitates quantitative analysis between different factors that are linked together. This thesis will look specifically at the elevating tensions between Israel and Iran with such a model to estimate whether the known factors can lend information to forecast the prospect of action by Israel as the two nations reach thresholds for combat. Specifically, this work will account for factors that would likely be present and perhaps predictive of Israel making a preemptive strike on Iran. The objective will be to create a product that can be used by an intelligence analyst as a briefing tool and to gauge its effectiveness as a potential decision-making aid for commanders.

KEYWORDS: influence modeling, situational influence assessment module (SIAM), Iran, Israel, Middle East, predictive factors in conflict, nuclear weapons

DETERRENCE AND CYBER-WEAPONS

Patrick T. Hemmer–Major, United States Army
B.S., United States Military Academy, May 1999
Master of Science in Information Systems and Operations, March 2013
Advisor: Leo Blanken, Department of Defense Analysis
Second Reader: CDR William Robinette, Department of Information Sciences

Rapid technological advancements and societal inclusion of these technologies have expanded civil and defense capabilities but have also created significant vulnerabilities. Cyber-weapons have the potential to affect interaction between states by exploiting this vulnerability. To better understand the mechanics of how cyber-weapons affect state relations, this research applies a common framework to explore the attributes of traditional weapons—conventional, nuclear, and RMA—and how they typically influence this behavior. After proposing selected factors that influence the effectiveness of a cyber-attack, the research examines the cyber-attacks in 2007 on Estonia and 2008 on Georgia in order to provide a nuanced analysis on the role of the proposed causal factors. The proposed factors are government involvement, level of attack sophistication, and the degree to which the state is dependent upon digitally connected technology. The research indicates that the role of the state is one of the most significant factors in influencing the effectiveness of a cyber-attack and highlights the role that plausible deniability plays in this relationship. Some initial policy recommendations are

made based on the finding that the use of cyber-weapons as a deterrent is still ill-defined and that the focus should be on decreasing state vulnerability to these attacks.

KEYWORDS: cyber-deterrence, offensive cyber-attacks, Estonian cyber-attacks, Georgian cyber-attacks

EVALUATION OF U.S. NAVY SURFACE SHIP OPERATIONS IN THE INFORMATION DOMAIN

Crystal L. Sargent–Lieutenant, United States Navy
B.S., Jacksonville University, April 2005
Master of Science in Information Systems and Operations, March 2013
Advisor: Steven J. Iatrou, Department of Information Sciences
Second Reader: Deidre L. McLay, Captain, United States Navy, Department of Operations Research

This addresses the current configuration of surface naval vessels for employment in the information domain. It also addresses how surface assets such as the Aegis Guided Missile Cruiser (CG) and Destroyer (DDG) fit into the modern era of naval information dominance.

An evaluation of past experiences and current technology is used to recommend how to employ current surface assets for information operations (IO) capabilities.

This thesis also includes an evaluation of current topics regarding information dominance and the cyber domain, focusing on the areas of electronic warfare, cyber warfare, and military information support operations (MISO).

KEYWORDS: surface ship, cyber, information dominance, information operations (IO), long range acoustic device (LRAD), fire scout, electronic warfare, military information support operations (MISO)

MASTER OF SCIENCE IN INFORMATION TECHNOLOGY MANAGEMENT

AN ANALYSIS OF SMALL-BUSINESS CONCERNS AND NAVAL OPEN ARCHITECTURE: OPTIONS TO FACILITATE SMALL-BUSINESS PARTICIPATION IN THE DEPARTMENT OF THE NAVY

Christopher S. Bilinski–Lieutenant, United States Navy
B.S., Old Dominion University, May 2003
Master of Science in Information Technology Management, March 2013
Advisor: Thomas Housel, Department of Information Sciences
Second Reader: Glenn Cook, Department of Information Sciences

The open architecture strategy being utilized within the Department of the Navy (DON) has been built on a foundation that Naval open architecture (NOA) will provide an increase in competition and a decrease in costs and present an opportunity to maximize market innovation. The small-business concern (SBC) is often considered the catalyst to achieving these benefits. There have been mixed reviews of NOA, and there is research to suggest that there are barriers to SBC participation in the DON market. Through NOA, the DON would like to foster an environment that encourages SBCs to participate in the competition for DON contracts, thus yielding benefit to the DON. However, there remain skeptics that assert that the DON is failing to maximize the benefit of SBC participation in DON markets due to barriers. The result of these real or perceived barriers limits SBC participation and as a result, the DON fails to benefit from a truly competitive process.

The purpose of this study is to better to understand the relationship between NOA and the role of the SBC in DON contracting. The goal of this study is to understand and provide options to the real or perceived barriers SBCs encounter in NOA.

KEYWORDS: Naval open architecture, small-business concerns, competition

NMCI TO NGEN: MANAGING THE TRANSITION OF NAVY INFORMATION TECHNOLOGY INFRASTRUCTURE

Chukwudi N. Chukwuelue–Lieutenant, United States Navy
B.S., Morehouse College, December 2006
Master of Science in Information Technology Management, March 2013
Advisor: Frank Barrett, Department of Management
Second Reader: Mark Nissen, Department of Information Sciences

The Navy and Marine Corps Intranet (NMCI), which is second only to the Internet in size, was supposed to be a mechanism to transform and support the Navy and Marine Corps with an IT infrastructure that would move the Department of Navy into the 21st century of warfare. Its function was to enhance command and control initiatives of the Navy and Marine Corps by harnessing the power of an integrated network. The current state of NMCI, though marred by a decade filled with marginal successes and many setbacks, is very positive, boasting more than 700,000 users and consisting of over 380,000 work stations in more than 3,000 locations dispersed over seven continents. In 2008, Department of the Navy leadership decided to move on and embrace the Next Generation Enterprise Network (NGEN) guided by early transition activities (ETAs) and a continuity of services contract. The use of the ETAs was meant to successfully mitigate the risk while migrating services from a contractor-owned, contractor-operated model to one that gives the government

increased command and control. The purpose of this research is to examine the effectiveness of ETAs and concurrent contracts in mitigating the challenges of migrating from the NMCI environment.

KEYWORDS: Navy Marine Corp Intranet, Next Generation Enterprise Network, NMCI, NGEN, transition, change management, stakeholder management

THREE-DIMENSIONAL SPACE TO ASSESS CLOUD INTEROPERABILITY

Sallouha Fazai–Lieutenant Junior Grade, Tunisian Navy
B.S.C.E., Tunisian Naval Academy, June 2007
Master of Science in Information Technology Management, March 2013
Advisor: Man-Tak Shing, Department of Computer Science
Second Reader: Albert Barreto III, Department of Information Sciences

Cloud computing is an emerging technology that promises the reduction of IT costs (personnel, software, and hardware) for enterprises, as well as individual users. Despite this appealing offer, this technology has still not been widely adopted in the IT enterprise. Users are still worried about vendor lock-in; they will not be able to move their data and applications from one cloud provider to another easily or return to in-house IT. Currently, users do not have the means to specify and assess the interoperability level of the cloud provider that they desire to entrust their IT operations. In this thesis, we provide a three-dimensional space to assess and visualize the interoperability level of any cloud provider so that cloud users can select the provider's services that better fit their interoperability needs.

KEYWORDS: cloud computing, interoperability, cloud provider lock-in, three-dimensional space

EVALUATION AND IMPLEMENTATION OF MEDIA-INDEPENDENT HANDOVER IN HASTILY FORMED NETWORKS

Khaled Ferchichi–Lieutenant, Tunisian Navy
B.S., Tunisian Naval Academy, 2006
Master of Science in Information Technology Management, March 2013
Advisor: Geoffrey Xie, Department of Computer Science
Second Reader: Brian Steckler, Department of Information Sciences

Hastily formed networks (HFNs) are deployed in the aftermath of a disaster. They are formed by people from different communities who work together in a shared conversation space. The network component of the shared conversation space is the backbone of the communication system. It can be created using technologies such as Ethernet, WiFi, and WiMAX. HFNs face huge challenges in the integration of mobile devices that will provide better mobility in the conversation space, especially with the fast proliferation of multimodal mobile devices that support many technologies. In this research we investigate whether the integration of the media independent handover (MIH) in HFNs can be an adequate solution for these problems.

MIH could be the solution to not only the mobility and roaming problems but also for other HFN problems due to the intelligent layer-two functions it offers. We tried to combine MIH and session initiation protocol (SIP) in order to provide HFN users a better user experience, especially during video and audio conversations. The research showed the limitations of MIH and its open source implementation (ODTONE). We were also able to describe the steps needed for the integration of SIP and MIH.

KEYWORDS: HFN, MIH, SIP, IEEE 802.21, WiFi, seamless handover, ODTONE, Mobility

THE NETTED HUMANITARIAN: IMPROVING THE INFORMATION AND COMMUNICATIONS TECHNOLOGY ASSESSMENT PROCESS FOR HUMANITARIAN ASSISTANCE/DISASTER RELIEF MISSIONS

Christian X. Gutierrez–Lieutenant, United States Navy
B.A., University of Idaho, May 2005
Master of Science in Information Technology Management, March 2013
Advisor: Brian Steckler, Department of Information Sciences
Second Reader: Glenn Cook, Department of Information Sciences

Setting up reliable communications after a disaster is an extremely difficult yet crucial requirement for coordinating relief efforts. Lessons learned from recent humanitarian disasters point to major difficulties in establishing communications to quickly and accurately assess responder needs in the affected area and in communicating this information to first responders from government relief agencies, non-governmental organizations (NGOs), and the military.

The military's growing role in humanitarian assistance/disaster relief (HA/DR) missions makes it imperative that military first responders coordinate with partner relief groups to improve the current assessment and relief processes. The current assessment and relief processes are generally ineffective due to inherent mistrust between responding organizations and lack of experience working together in a chaotic and time-pressed environment.

This research analyzes issues with the current processes utilized by responders in HA/DR missions and researches whether "netted humanitarian" responders trained in the set-up and operation of hastily formed network (HFN) equipment can improve the process of assessing the ICT situation on the ground following a disaster. It further delves into the likelihood that these highly trained individuals will expeditiously overcome the communications vacuum that immediately follows a natural disaster and will prove beneficial in coordinating the combined recovery efforts of responding organizations.

KEYWORDS: hastily formed network, humanitarian assistance/disaster relief (HA/DR), wireless technology, satellite communications

INTEGRATING COORDINATED PATH-FOLLOWING ALGORITHMS TO MITIGATE THE LOSS OF COMMUNICATION AMONG MULTIPLE UAVS

Kyungnho Kim–Lieutenant, United States Navy
B.S., KyungNam, March 1998
Master of Science in Information Technology Management, March 2013
Advisor: Raymond R. Buettner Jr., Department of Information Sciences
Co-Advisor: Vladimir N. Dobrokhodov, Department of Mechanical and Aerospace Engineering
Co-Advisor: Kevin D. Jones, Department of Mechanical and Aerospace Engineering

This thesis addresses the problem of mid-air collision avoidance among multiple autonomous unmanned aerial vehicles (UAVs) capable of communicating their flight states across a time-varying communication network. The UAVs' capabilities, to (a) follow a given path and to (b) exchange and coordinate their relative position while on the path, are considered the key factors enabling the time-critical coordination that in turn guarantees the safety of flight. This thesis is based on the key results of the recently developed concept of coordinated path-following (CPF) for multiple autonomous agents. While the path-following methodology is adapted without modification, the information exchange over the time-varying communication network and its impact on the performance of coordination was analyzed in a comparative study. The impact of the time-varying information flow is represented by the loss of link ratio, which is the ratio of time without information exchange to the nominal timeframe of communication in a given bidirectional network. The particular coordination metrics utilized are the coordination error (difference between the relative positions of UAVs on the paths) and the Euclidian distance between the UAVs (space separation). On the other hand, the control effort necessary to achieve the desired coordination is represented by the level and variation of the commanded

velocity profile. The particular goal of the numerical study was to understand the amount of control effort required to achieve the desired separation of UAVs capable of exchanging a minimum number of parameters over a degrading communication network.

KEYWORDS: unmanned aerial vehicles, situational awareness, loss link, SAA, search and avoid, MATLAB, SIMULINK, safety assurance mechanism

ANALYSIS OF THE UNITED STATES COMPUTER EMERGENCY READINESS TEAM'S EINSTEIN III INTRUSION DETECTION SYSTEM, AND ITS IMPACT ON PRIVACY

William L. Oree–Lieutenant, United States Navy
B.S., Armstrong Atlantic University, May 2004
Master of Science in Information Technology Management, March 2013
Advisor: Glenn Cook, Department of Information Sciences
Second Reader: John Fulp, Department of Computer Science

To secure information technology and telecommunications systems, the U.S Department of Homeland Security created the United States Computer Emergency Readiness Team (U.S. CERT) to provide 24-hour early warning and detection for the federal government's Internet infrastructure. A leading program in this effort, EINSTEIN, was developed by U.S. CERT in partnership with the National Security Agency (NSA) and private industry. EINSTEIN is an intrusion detection program that monitors network traffic and searches for signatures of known malicious code. Now in its third generation, EINSTEIN generates alerts that have the possibility of including personal identifying information and monitoring live traffic on networks in real-time, and the ability to counter the intrusion as it takes place.

By reviewing current privacy policy and past privacy case studies, in addition to careful analysis of federal court cases and statutes, this thesis establishes the fundamental and constitutional right to privacy. Through secondary research, this thesis identifies elements and exemptions of current communications legislation that can be used in the development of a comprehensive cyberspace monitoring policy. The result is a recommendation that a new Einstein III privacy impact assessment, as well as a new legal opinion document, be drafted to balance the trade-off between privacy rights and the objectives of securing cyberspace, and to establish a proper legal foundation for the implementation of the controversial technology.

KEYWORDS: EINSTEIN, intrusion detection system, cybersecurity, privacy

MOBILE DEVICE MANAGEMENT IN THE DOD ENTERPRISE NETWORK: FACTORS FOR RISK MANAGEMENT, INTEGRATION, AND IT ACQUISITION

Donald E. Pratt Jr.–Major, United States Army
B.B.A., Texas Christian University, May 2003
Master of Business Administration, June 2013
Brian K. Jones–Major, United States Army
B.S., East Tennessee State University, May 2000
Master of Science in Information Technology Management, March 2013
Advisor: Glenn Cook, Department of Information Sciences
Co-Advisor: Brad Naegle, Graduate School of Business and Public Policy
Third Reader: Douglas Brinkley, Graduate School of Business and Public Policy

The Office of the Department of Defense Chief Information Officer (DOD CIO) has developed a mobile device strategy that will require the acquisition process of the DOD's information technology (IT) system to acquire a mobile device management (MDM) toolset to mitigate information assurance (IA) risks created through the use of mobile devices on the enterprise domain. In an effort to target affordability and control cost growth, IT professionals need to understand how IA concerns are addressed through MDM and how

properly scoped solutions can be sourced to reduce project risks related to cost, schedule, and performance for projects that involve obtaining an MDM toolset through the DOD acquisition process.

This research develops a mixed method study to understand the concerns of federal information technology professionals who are knowledgeable about MDM and the acquisition professionals who procure the MDM solutions. In this research, the authors provide DOD professionals with a framework to select optimal MDM solutions through the identification of baseline requirements in order to operate effectively in a resource-constrained environment.

KEYWORDS: mobile device management, MDM, mobile device security, information assurance, IA, information technology management, ITM, cost effectiveness analysis, CEA, enterprise architecture

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF SCIENCE IN MANAGEMENT

ANALYSIS OF MARINE CORPS EFFORTS IN THE PURSUIT OF THE JOINT BLUE FORCE SITUATIONAL AWARENESS CAPABILITY

Norris J. Alexander–Major, United States Marine Corps
B.S., Dowling College, June 1997
Master of Science in Management, March 2013
Advisor: Brad Naegle, Graduate School of Business and Public Policy
Second Reader: Keith Snider, Graduate School of Business and Public Policy

The purpose of this thesis is to analyze Marine Corps efforts to comply with the Joint Requirements Oversight Council (JROC) directive for a single Joint Blue Force situational awareness (JBFSA) capability. The shared battlespace is saturated with stovepipe digital situational awareness and command and control systems. To ensure interoperability between ground forces, JROC Memorandum 163–04 (2004) approved the Marine Corps and Army convergence strategy to adapt a single JBFSA capability. An incremental approach strategy was adopted to reach SA convergence. Joint Capabilities Release (JCR) represents increment I and is currently being fielded to operational units within the Army. Joint efforts are ongoing to develop and test increment II, the Joint Battle Command-Platform (JBC-P). Both software packages leverage fielded Blue Force Tracker (BFT) hardware and provide enhanced capabilities to address JROC convergence directives.

JCR and JBC-P were designed to coincide within the Army Battle Command System (ABCS). As a result, both solutions are more Army centric than Marine Corps centric. Consequently, mismatches exist within and beyond the software between the Services. The primary challenge for the Marine Corps' team is marrying the solutions with the Marine Air-Ground Task Force (MAGTF) systems and architecture.

KEYWORDS: Joint Blue Force situational awareness, command and control

RETENTION ELASTICITY AND PROJECTION MODEL FOR U.S. NAVY MEDICAL CORPS OFFICERS

Abdullah S. Alshehri–Commander, Royal Saudi Naval Force
B.S., King Fahd Naval Academy, 1996
Hyrum T. Brossard–Lieutenant Commander, United States Navy
MHA, Indiana University, 2004
Master of Science in Management, March 2013
Advisor: Yu-Chu Shen, Graduate School of Business and Public Policy
Second Reader: Dina Shatnawi, Graduate School of Business and Public Policy

Retaining skilled doctors in the Navy's Medical Corps has become increasingly difficult due to the Global War on Terrorism (GWOT) and lucrative positions outside the military. This thesis estimates probit models to evaluate the effect that the civilian–military pay gap has on the overall Medical Corps retention rate across 19 specialties using data gathered from the Bureau of Medicine and Surgery and the Medical Group Management Association from Fiscal Year (FY) 2002 to FY2011. In particular, this study measures the overall retention elasticity and elasticity estimates for three main specialty groups (primary care, surgical specialties, and other specialties) and 19 individual specialties. Furthermore, projection models are employed to predict the Medical Corps' future retention rates. Finally, this study seeks to understand whether the protracted GWOT has an effect on the retention behavior of the Navy's Medical Corps.

The results indicate that a 1% increase in the pay gap reduces the overall retention probability by 0.24%. The surgical group shows the highest retention elasticity (–0.31) while the other specialties group exhibits the least responsiveness (–0.19). The projection models estimate that the aggregate retention probability for FY2012 will be one percentage point lower than the actual retention rate of FY2011 (58%). Finally, the prolonged GWOT has reduced the overall retention rate by 14.1 percentage points.

KEYWORDS: lossless data compression, discrete mathematics, analysis of algorithms, Huffman coding, rotational tree, index tree

U.S. NAVY OFFICER ATTITUDES ON THE REPEAL OF "DON'T ASK, DON'T TELL"

Ryan P. Appleman–Lieutenant, United States Navy
B.S., University of Texas at Austin, 2005
Peter S. McLaughlin–Lieutenant Junior Grade, United States Navy
B.S., University of South Carolina, 2010
Master of Science in Management, March 2013
Advisor: Dr. Mark J. Eitelberg, Graduate School of Business and Public Policy
Second Reader: Dr. Frank J. Barrett, Graduate School of Business and Public Policy

"Don't Ask, Don't Tell" (DADT) prohibited gays from serving openly in the military from December 1993 to September 2011. In February 1994, a survey of Navy officers was administered at the Naval Postgraduate School exploring attitudes toward DADT. This survey was re-administered in 1996, 1999, 2004, and 2010. The surveys revealed an increasing acceptance of gays in the Navy. The present study, conducted post-repeal, utilized the same NPS survey along with focus-group interviews to examine the following: policy, cohesion, leadership, tolerance, unit effectiveness, and military environment. The results show that the trend toward increasing acceptance has continued, as a majority of Navy officers strongly support the service of homosexuals. At the same time, a number of officers claim to feel uncomfortable sharing living quarters with a homosexual. Differences in attitudes were found by rank and years of service. It is recommended that the study be continued and expanded to include a more representative population of Navy officers and enlisted personnel. Furthermore, the post-repeal effects on readiness should be monitored, particularly for fairness and potential harassment. The thesis includes appendices with survey trend data from 1994 to 2012 and response frequencies from a concurrent survey of Marine Corps officers.

KEYWORDS: homosexuality, gays, lesbians, DADT, "Don't Ask, Don't Tell," sexual orientation discrimination, inequality, prejudice, human rights, same-sex marriage, same-sex benefits, personnel policy, gay ban, repeal of DADT, LGBT, DOMA, Defense of Marriage Act

FROM PUSH TO PULL: BARRIERS TO MALSP MODERNIZATION

James Beeson–Captain, United States Marine Corps
B.A., Columbia College, 2004
Anthony D. Ripley–Captain, United States Marine Corps
B.S., University of Idaho, 2007
Master of Science in Management, March 2013
Advisor: Chad W. Seagren, Department of Operations Research
Second Reader: Keith Snider, Department of Acquisition Management

The Marine Aviation Logistics Support Program (MALSP) is the current concept that Marine aviation uses to sustain aircraft readiness through the maintenance of aircraft and the supply of aircraft parts. The MALSP is a push system that deploys a large footprint of parts, personnel, and supporting infrastructure. This large footprint, commonly referred to as the "iron mountain," is expensive to deploy and maintain. In order to minimize cost, an initiative known as the MALSP II has evolved.

Utilizing a demand-based logistics response of MALSP II, the Marine Corps will deploy a reduced aircraft maintenance and aviation supply footprint. Parts will be distributed through various nodes. As parts are requisitioned, demand triggers parts to be pulled from these nodes. Theoretically, the transition to a pull system will increase response time, minimize cost, and decrease wait time. The purpose of this thesis is to perform a qualitative analysis of MALSP II to identify barriers to modernization and provide recommendations to mitigate risk.

Areas of concern include information technology (IT)—specifically Marine Aviation Logistics Enterprise Information Technology (MAL-EIT)—and interoperability with Global Combat Support Systems–Marine Corps (GCSS–MC), funding, maturity, supportability, organizational barriers to MALSP modernization; and inventory management.

KEYWORDS: MALSP, MAL-EIT, aviation readiness, EPUK, NGEN-BMS, NGBMS, GCSS-MC, GCSSMC, LPT, logistics, supply, organizational behavior barriers, E2E, end-to-end, AIRSpeed, buffers, PMALS, ESB, MOB, FOB

HUMAN CAPITAL MANAGEMENT THROUGH THE USE OF A STANDARD INTEGRATED PERSONNEL SYSTEM IN ROYAL SAUDI NAVAL FORCES

Abdullah A. Benghaith–Lieutenant Commander, Royal Saudi Naval Forces
B.A, King Fahad Naval Academy, Al-Jubail, 1999
Master of Science in Management, March 2013
Advisor: William Hatch, Graduate School of Business and Public Policy
Second Reader: Benjamin J. Roberts, Graduate School of Business and Public Policy

The Royal Saudi Naval Forces (RSNF) are continuously searching for a better means to manage manpower and personnel. The RSNF manpower department is currently studying the available methods and procedures that will ensure a stable leverage of human capital. The study also examines knowledge levels to support optimal information-technology management.

The research initially examined the background of the evolution of the Kingdom of Saudi Arabia and its armed forces. This thesis illustrates the current status of the human capital management system in the Royal Saudi Naval Forces and presents the common human capital management systems used in both military and civilian organizations around the globe. It also evaluates these systems' features and characteristics. The thesis presents the requirements a new system must meet in a given practical and technological environment. Finally, it addresses the expected results that the RSNF will gain after an appropriate new system is acquired. Additionally, the research recommends a review of the current RSNF manpower and personnel organization to better support short- and long-term organizational planning objectives.

KEYWORDS: manpower, Kingdom of Saudi Arabia, human resources, knowledge management, personnel management, human resources management system, Royal Saudi Naval Forces, human capital

MARINE CORPS OFFICER ATTITUDES TOWARD THE REPEAL OF "DON'T ASK, DON'T TELL"

Grant W. Callahan–Captain, United States Marine Corps
B.S., University of Illinois, 2007
James D. Paffenroth–Lieutenant Commander, United States Navy
B.S., Virginia Tech, 2000
Master of Science in Management, March 2013
Advisor: Mark J. Eitelberg, Graduate School of Business and Public Policy
Co-Advisor: Frank J. Barrett, Graduate School of Business and Public Policy

"Don't Ask, Don't Tell" (DADT) prohibited gays from serving openly in the military from December 1993 to September 2011. The present study, conducted over one year after DADT's repeal, utilized a survey of attitudes toward DADT that was previously administered to Marine Corps officers at the Naval Postgraduate School (NPS) in 1999, 2004, and 2010. This survey, re-administered to NPS Marine officers in November 2012, addressed the following areas: policy, cohesion, leadership, tolerance, unit effectiveness, and military readiness. A comparison of results from the four surveys shows a clear trend of increasing acceptance toward homosexuals in the military. Levels of acceptance tended to vary by military occupational specialty and length of service. Additionally, many Marine officers continued to express concern about habitability and personal comfort. These and other issues were further explored with Marine officers in three focus-group sessions. Overall, study results indicated strong agreement that the current policy protects the rights of all Marines, regardless of sexual orientation. Finally, Marine officers expressed confidence that the training they received adequately prepared them to execute the repeal of DADT. The thesis includes appendices with survey trend data from 1999 to 2012 and response frequencies from a concurrent survey of Navy officers.

KEYWORDS: homosexuality, gays, lesbians, bisexuals, LGB, DADT, "Don't Ask, Don't Tell," sexual orientation, discrimination, inequality, prejudice, same-sex marriage, same-sex benefits, personnel policy, gay ban, repeal of DADT, Defense of Marriage Act, DOMA

LEADING MARINES IN A DIGITAL WORLD

Lucas M. Chesla–Captain, United States Marine Corps
B.S., University of Texas at Austin, May 2005
Master of Science in Management, March 2013
Advisor: Marco DiRenzo, Graduate School of Business and Public Policy
Co-advisor: Cynthia King, Graduate School of Business and Public Policy

Leadership and communication are essential for winning wars. Email is a reality and is good for some things; however, there is no substitute for face-to-face (F2F) interaction when it comes to building relationships. Relationships are a reality in any organization, but they are more important in an organization like the Marines when lives are on the line. Senior leaders should establish mutually trusting relationships with junior leaders before deploying to a combat zone, at which point it may be too late. Even in the best relationships and under the influence of a great leader, conflicts will occur. Some conflict is healthy, but too much can be detrimental to unity. Marine leaders would do well to implement a comprehensive conflict management strategy in order to maintain unit cohesion and create a safe environment for junior Marines to express their concerns and opinions. Servant-leadership is a comprehensive leadership model that encompasses all necessary attributes for fostering trusting relationships and managing conflict and, therefore, is the most appropriate model for the Marines. Empowering servant-leaders in the Marine Corps will help the Marines enhance their organizational culture and allow them to continue to focus on executing their primary mission: to protect our nation's interest at home and abroad.

KEYWORDS: leadership, lead, trust, conflict, management, servant-leadership, marines, conflict management, email, Marine Corps, organizational trust, organizational management

LEADING FACTORS DETERMINING LATERAL TRANSFER SUCCESS

Ryan T. Dailey–Lieutenant, United States Navy
B.S., San Diego State University, May 2007
Master of Science in Management, March 2013
Advisor: Dina Shatnawi, Graduate School of Business and Public Policy
Co-Advisor: Bill Hatch, Graduate School of Business and Public Policy

This study examines the characteristics of officers applying to and being selected by lateral transfer boards using biannual redesignation data from November 2010 through November 2012. The lateral transfer board reviews approximately 500 applicants each year. The majority of the restricted line designators rely on lateral transfer boards as their primary means of accessing new officers, of which the average applicant is an O-3, a male, and a surface warfare officer (1110). Although the applicants are moderately different at each board, the aggregate selection rate is 40 percent. A probit analysis suggests that officers who are most likely to be successful at redesignating are Hispanic and O-4, as well as limited duty officers. The regression results indicate that there is no gender difference in selection, but senior pay grades are selected at a higher rate, wherein information professional and foreign area officer communities currently have the greatest demand for officers at the lateral transfer boards. Additionally, surface warfare provides the greatest supply of applicants on average, but holding all else equal, an officer is less likely to be selected if he or she applies as a surface warfare officer.

KEYWORDS: lateral transfer, redesignation, accessions, designators, force structure, manpower, end-strength

MERGING OF THE RECRUITMENT BRANCH AND THE POLITICAL INFORMATION BRANCH OF THE GERMAN ARMED FORCES AND APPLICATION OF THIS RECRUITMENT NETWORK TO SAUDI ARABIA

Thorsten Diekmann De Santiago–Lieutenant Commander, German Navy
Master of Education, University of the Federal Armed Forces, Hamburg, Germany, 1997
Khalid Alghamdi–Lieutenant Commander, Royal Saudi Naval Forces
King Fahd Naval Academy, Aljubail, Saudi Arabia, 1998
Master of Science in Management, March 2013
Advisor: Susan Heath, Graduate School of Business and Public Policy
Second Reader: Charles LaCivita, Defense Resources Management Institute

The recruitment branch and the political information branch of the German Armed Forces have always been separated. Now, in times of a continuously shrinking budget and several ongoing reforms that include a massive reduction of the personnel body, we must rethink this structure. Merging these two branches would mean savings in the budget. Furthermore, we can assign the released personnel to other tasks, for which the forces need highly trained personnel.

This cost-benefit analysis evaluates the status quo exclusively for one German state, compares this status quo to possible alternatives, and gives recommendations for the future of the two branches. For the optimal distribution of staff and offices, this analysis employs optimization modeling. We apply the resulting recruiting model to Saudi Arabia and assess the results based on that. Saudi Arabia is interested in potentially adopting the German system, and we use the developed model to recommend the best recruiting locations in Saudi Arabia.

KEYWORDS: German Armed Forces, recruitment branch, political information branch, cost-benefit-analysis, recruiting model, optimization modeling, Saudi Arabia

ANALYSIS OF THE UNITED STATES NAVY FOREIGN AREA OFFICER PROGRAM

Jesse T. Grano–Lieutenant, United States Navy
B.S., University of Connecticut, May 2005
Master of Science in Management, March 2013
Advisor: Deidre McLay, Department of Operations Research
Second Reader: Benjamin Roberts, Graduate School of Business and Public Policy

The United States Navy foreign area officer (FAO) program has been in the developmental stage since its inception in 2006 and should be examined to find ways to improve it and create efficiency in the four areas of utilization, training, promotion, and accessions. Many senior officers and government executives can provide valuable insight on areas for improvement and growth. This thesis was designed to collect those lessons learned and consolidate them to see where common threads may apply. Gathering this knowledge at the corporate, operational, and strategic levels will lead to increased capabilities and efficiencies in the FAO program.

KEYWORDS: foreign area officer, FAO, accession, training, utilization and promotion

ANALYSIS OF THE MARINE CORPS EDUCATIONAL TIER SYSTEM

Andrew L. Holmes–Captain, United States Marine Corps
B.S., United States Naval Academy, 2006
Master of Science in Management, March 2013
Advisor: Elda Pema, Graduate School of Business and Public Policy
Second Reader: Mark J. Eitelberg, Graduate School of Business and Public Policy

This thesis analyzes the effects of certain demographic characteristics on first-term attrition and fleet attrition from the U.S. Marine Corps. The demographic characteristics studied include age, dependency status, gender, race, the Armed Forces Qualification Test (AFQT) score, and educational credentials. The Marine Corps currently screens applicants based on educational credentials by utilizing the tier system. In 2012, the Marine Corps decided to shift the home-school educational credential to tier I status. Thereafter, analysis was conducted to determine the effects of this shift. Probit regression models were constructed to explain the likelihood of first-term and fleet attrition based on educational credentials. The data draw from the USMC's total force data warehouse for all enlisted cohorts between fiscal years 2003 and 2007.

Model results show that educational tiers are inaccurate at predicting first-term and fleet attrition among certain educational credentials and demographics. The model also shows that the tiers become less accurate once the home-school education credential is moved to tier I status. Similarly, the results demonstrate that there are different factors that predict first-term attrition when compared with the survivors of boot camp who attrite after reaching the fleet. Results also show that gender, dependency status, and educational credentials are all significant factors in predicting first-term and fleet attrition.

KEYWORDS: attrition, education credentials, tier system, recruiting, eligibility, Marine Corps Recruit Command

MILLENNIAL GENERATION OPINIONS OF THE MILITARY: A CASE STUDY

Jeremy N. Hyler–Lieutenant, United States Navy
B.S., University of Washington, June 2004
Master of Science in Management, March 2013
Co-Advisor: Mark J. Eitelberg, Graduate School of Business and Public Policy
Co-Advisor: Benjamin J. Roberts, Graduate School of Business and Public Policy

This study examines the attitudes, values, and beliefs of the Millennial Generation as they relate to military service. Specifically, the study looks at factors that influence Millennials' perceptions of the military, including

attitudes toward the repeal of the policy known as "Don't Ask, Don't Tell." Information was collected via a survey and follow-up focus group discussions, administered in February 2011 at four community colleges in the Monterey Bay area. A total of 481students participated. Data analysis focused on identifying attitudinal changes over the past 10 years, particularly across gender. Study results reveal the following: youth have little knowledge about the military and the educational opportunities available; higher education is the military's top competitor; female Millennials are more likely to attend college after high school; Millennials value extrinsic benefits, as well as intrinsic benefits such as flexibility in the workplace; and the majority of youth support equal rights, believing that gays should not be restricted from military service. Recommendations are offered to improve recruiting, particularly in better aligning individual goals with the military's unique value to achieve these goals.

KEYWORDS: Millennials, Generation Y, military recruiting, youth attitudes, perceptions, DADT, "Don't Ask, Don't Tell," repeal of DADT

MOTIVATING EMPLOYEES IN TIMES OF RECESSION: RECOMMENDATIONS FOR THE HELLENIC NAVY

Dimitrios Kechagias–LCDR, Hellenic Navy
B.S., Hellenic Naval Academy, June 1996
Master of Science in Management, March 2013
Advisor: Edward H. Powley, Graduate School of Business and Public Policy
Second Reader: Benjamin J. Roberts, Graduate School of Business and Public Policy

The 2008 global economic crisis severely affected Greece and all organizations operating in its economy—the Hellenic Navy among these. The need for motivation in the workplace with the current conditions is more important than ever, in order to mitigate potential reduction of productivity and to advance performance excellence. This study attempts to identify effective ways to motivate employees specifically under the current economic crisis. In so doing, the effects of economic decline on employees and organizations are examined, and prominent motivation theories and applications are referenced. Furthermore, analysis of four specific case studies illuminates issues related to motivation in crisis situations. The thesis concludes with a set of motivational techniques that may minimize the effects of the recession and its consequences on employees and organizations. Finally, specific recommendations that the Hellenic Navy might consider are proposed.

KEYWORDS: Hellenic Navy, Greece, financial crisis, motivation, military personnel, effects of recession, employee motivation, performance

MEDICAL SEPARATION AMONG CAREERISTS

Sara N. Kirstein–Captain, United States Marine Corps
B.A., Nyack College, 2006
Master of Science in Management, March 2013
Advisor: Yu-Chu Shen, Graduate School of Business and Public Policy
Co-Advisor: Jesse Cunha, Graduate School of Business and Public Policy

The last 10 years have presented the Marine Corps with the challenge of continuous deployments to hostile environments at an unprecedented rate. This study examines the correlation between deployment tempo and medical separation rates for Marines who have shown an intention to remain in the service by reenlisting beyond their first term. It does so by comparing the probability of medical separation for careerists relative to other causes of separation. The data comes from the Marine Corps's total data force warehouse. Interaction effects were measured using a linear probability model and probit estimations.

Key variables in my study are gender, a 9/11 partition, and the number of deployments. Medical separations are defined as acute sources, such as loss of limbs; degenerative sources, such as back pain and other long-term

ailments; and medical retirements.

Among those separated, I find that the increased deployment tempo in the post-9/11 era has led to decreases in medical separation rates, particularly among those with two or more deployments. There is also a notable additional decrease in medical separation for female Marines who have deployed.

KEYWORDS: medical separation, combat, women, females, careerist, USMC, marines

PREDICTING DISHONORABLE DISCHARGE AMONG MILITARY RECRUITS

Oleksiy Kryvonos–Lieutenant Colonel, the Armed Forces of Ukraine
M.E., Kyiv Land Force Institute, 1997
M.A., Ukrainian State University of Finance and International Trade, 2009
Master of Science in Management, March 2013
Advisor: Jesse Cunha, Department of Business and Public Policy
Co-Advisor: Ryan Sullivan, Defense Resources Management Institute

This study examines a recruit's potential for military success, as measured by dishonorable discharge from military service. Specifically, it estimates the statistical relationship between personal demographics and background characteristics of recruits and future dishonorable discharge. The data comes from the Defense Manpower Data Center and includes all military recruits between 2000 and 2012. The analysis involves regressing an indicator for being dishonorably discharged among the recruit's age, gender, race, education level, marital status, number of dependents, prior military service, Armed Forces Qualification Test (AFQT) score, weight, height, and citizenship status at the time of signing the contract. The results of the model show that gender, age, number of dependents, prior military service, AFQT score, and race variables could be significant determinants for persons who were dishonorably discharged from military service. Based on our research, we can recommend that the military consider increasing the quota of females in the armed forces; continue looking for potential recruits with higher AFQT scores, higher educational levels, and prior military experience; and reduce the number of waivers given to persons who have a greater number of dependents.

KEYWORDS: dishonorable discharge, personal demographics, recruiting, military success

DEVELOPING A MARKOV MODEL FOR FORECASTING END-STRENGTH OF SELECTIVE MARINE CORPS RESERVE OFFICERS

Anthony D. Licari–Major, United States Marine Corps
B.S., United States Naval Academy, May 1998
MBA, University of Maryland, September 2009
Master of Science in Management, March 2013
Advisor: Chad W. Seagren, Department of Operations Research
Second Reader: Jonathan Price, Manpower & Reserve Affairs

This thesis develops Markov models for prior service (PS) and non-prior service (NPS) Selected Marine Corps Reserve (SMCR) officers. Data were collected from the total force data warehouse (TFDW) for all SMCR officers who served between September 30, 1998 and October 31, 2012. Determining SMCR officer end-strength is necessary for reserve manpower planners to balance the force structure, to minimize personnel excesses and shortages that impact training and labor costs, and to manage career progression.

The PS model validation and analysis show that an aggregate monthly rate and unique monthly transition rates produce similar results. Both models perform well, and they are consistent and accurate. Consistency and accuracy are important because budget planners and the recruiting command rely on manpower estimates during the fiscal year. Overall, the aggregate monthly rate models perform slightly better than the unique monthly transition-rate models with respect to end-strength prediction, average strength prediction, and cost. More important, all four PS models performed better than the current Reserve Affairs model.

We are unable to validate the NPS officer model. Since there are so few observations, the transition rates are suspect because they have a very high variance.

KEYWORDS: manpower planning, Marine Corps Reserve, Markov model, end-strength, officer manpower

ANALYSIS OF THE U.S. NAVY'S GOAL-BASED AWARDS SYSTEM AND ITS EFFECT ON RECRUIT QUALITY

Tequila McGlocking–Lieutenant, United States Navy
B.S., Norfolk State University, 2006
Master of Science in Management, March 2013
Advisor: Jeremy Arkes, Graduate School of Business and Public Policy
Second Reader: Stephen Mehay, Graduate School of Business and Public Policy

The Commander of the Navy Recruiting Command (CNRC) has changed the awards and incentives system in recent years in an effort to increase recruiter productivity and promote recruit-quality goal achievement. The latest awards and incentive system updates have placed increased emphasis on recruit quality in support of Navy Recruiting Command's strategic plan Recruit Force 2020. This thesis provides a detailed overview of the current Navy awards and incentives system. The thesis also attempts to estimate the effect of specific awards on the quality of recruit contracts. Furthermore, this thesis estimates the effect of monthly goaling targets on the quality of recruits. The objective is to determine whether the current Navy awards and incentive system has an unintended consequence of reducing recruit quality. The analysis tests whether recruiters sacrifice quality as the end of the month approaches to meet their monthly goaling deadline. Also, the analysis tests the impact of the Gold Wreath award on recruiter productivity and recruit quality. The results indicate that recruit quality tends to fall as the end-of-the-month approaches, specifically during the last week of the month. However, the results did not support the hypothesis that recruiters sacrifice quality to obtain their first Gold Wreath award.

KEYWORDS: Commander of the Navy Recruiting Command, awards and incentives system, Gold Wreath award, Recruit Force 2020, recruit quality, ordinary least squares regression, recruiter goaling process, Armed Forces Qualification Test (AFQT) scores, high school diploma graduate (HSDG)

IMPROVING MARINE CORPS ASSIGNMENT OF SDAP LEVELS

Miguel Moreno–Captain, United States Marine Corps
B.S. Architecture, University of Idaho, 2004
Master of Science in Management, March 2013
Co-Advisor: Elda Pema, Graduate School of Business and Public Policy
Co-Advisor: Chad W. Seagren, Department of Operations Research

The purpose of the special duty assignment pay (SDAP) program is to provide incentives to encourage highly qualified and capable Marine participants to fill demanding special duty assignment (SDA) billets. The types of SDA billets include, but are not limited to, drill instructors, combat instructors, recruiters, career planners, marine security forces/embassy guards, and senior enlisted advisors. SDAP compensation levels range from a minimum SDAP level 1 of $75 to a maximum SDAP level 6 of $450. Ensuring this program makes efficient use of its limited budget is even more critical in periods of fiscal uncertainty. This study employs ordinary least squares and fixed effects multivariate regression models to examine the correlation between the quality of Marines serving in special duty assignment billets and SDAP levels. This thesis determined that quality of Marine participants is not a current consideration in the process of assigning SDAP levels. The quality variables evalu-

ated were GCT, meritorious promotion, proficiency and conduct markings, PFT and CFT. The results of the investigation also indicated which measure of quality is the best to include in the process of assigning SDAP.

KEYWORDS: special duty assignment pay (SDAP), special duty assignments (SDA), incentive compensation, SDAP levels, SDAP process

LITTORAL COMBAT SHIP MANPOWER, AN OVERVIEW OF OFFICER CHARACTERISTICS AND PLACEMENT

Travis W. Pantaleo–Lieutenant, United States Navy
B.A., Virginia Military Institute, May 2007
Master of Science in Management, March 2013
Advisor: Dina Shatnawi, Graduate School of Business and Public Policy
Second Reader: William Hatch, Graduate School of Business and Public Policy

The littoral combat ship is intended to be minimally manned and designed to be manned by qualified officers to carry out and operate its multi-faceted mission. This study examines officer manpower and assignment as compared to requirements of ship classes with similar missions that littoral combat ships are intended to replace. A recommendation is made to increase the officer manpower requirement. A new manning metric is presented that accounts for the characteristics of demographic and occupational standards of previous littoral combat ship officers. The research presents a qualitative comparative analysis and provides a model framework for future littoral combat ship manning once a larger inventory of officers have completed tours and more officer data is available.

KEYWORDS: littoral combat ship, manpower, surface warfare, manning, occupational standards, NOOCS, ship manpower document, manpower estimate report

EQUITABLY DISTRIBUTING QUALITY OF MARINE SECURITY GUARDS USING INTEGER PROGRAMMING

Jonathan Y. Sabado–Major, United States Marine Corps
B.S., U.S. Naval Academy, 1998
Master of Science in Management, March 2013
Advisor: Noah Myung, Graduate School of Business and Public Policy
Second Reader: Kenneth Doerr, Graduate School of Business and Public Policy

Established through the marine security guard (MSG) program during the 1940s, the Marine Corps and Department of State partnered to provide critical security to designated diplomatic facilities worldwide. Approximately 250 marines execute permanent change-of-station orders within the program five times every year to support personnel manning requirements. Are these marines being sent to the right location? Is one embassy unintentionally staffed with a disproportionate quality of MSGs? Is there a better metric to measure and assign marines based on a decision-maker's preference? The current assignment process is manpower-intensive and involves more than 15 personnel across three levels of command. At present, there is no formal methodology to quantify or measure how well MSGs are being assigned. The purpose of this research is to provide senior leaders of the Marine Corps Embassy Security Group (MCESG) Headquarters with an alternative method to complement the current assignment process by equitably distributing the quality of MSGs using integer programming. The results of this research support an improvement by up to 96 percent of distributing quality using the sum of squared differences across each region. The impact of using these alternative methods is expected to significantly decrease MCESG assignment man-hours.

KEYWORDS: integer programming, sum of squared differences, marine security guard, marine security guard program, equitably distributing quality, assignment problem

STUDY OF AN ALTERNATIVE CAREER PATH FOR DECK OFFICERS IN THE HELLENIC NAVY

Evangelos Simagias–Lieutenant Commander, Hellenic Navy
B.S., Hellenic Navy, June 1995
Master of Science in Management, March 2013
Co-Advisor: Mark J. Eitelberg, Graduate School of Business and Public Policy
Co-Advisor: Chad W. Seagren, Department of Operations Research

Since the first days of the Hellenic Navy, deck officers have come from the Hellenic Naval Academy (HNA). Currently, all deck officers after graduation from the HNA follow a direct but simple course of advancement. At each rank, deck officers must successfully fulfill certain career assignments—known as milestones—to continue on their career paths in the HN.

The present research seeks to determine if a second career path could be created to operate in tandem with the existing one. By introducing a second, parallel path, the HN would have greater flexibility in how it uses its deck officers. Additionally, a second career path might benefit officers who have special skills, allowing them to progress through the ranks based on different criteria such as technical expertise. The net result could help lower the Navy's operating costs during a time of economic uncertainty in Greece.

KEYWORDS: Hellenic Navy, ranks, career path, promotions, Markov models, performance, motivation, deck officers inventory, parallel inventories

A TRAINEE DEMAND ANALYSIS FOR THE EXPANSION OF THE MARINE CORPS EMBASSY SECURITY GROUP

Richard T. Slack–Major, United States Marine Corps
B.S., University of South Carolina, 1996
Master of Science in Management, March 2013
Advisor: Don Summers, Graduate School of Business and Public Policy
Second Reader: Simona Tick, Graduate School of Business and Public Policy

On September 11, 2012, the U.S. Consulate in Benghazi, Libya, was attacked, resulting in the death of four United States citizens, including Ambassador Christopher Stevens. Prior to Bengazi, the Marine Corps Embassy Security Group (MCESG) held a total strength of about 1,400 marines, of which 1,196 were Marine Corps security guards (MSG). In response to the deadly attack, Congress authorized 1,000 new MSGs through the 2013 National Defense Authorization Act, creating additional protection for U.S. diplomatic facilities worldwide. This thesis examines the growth requirements needed to support MCESG's expansion demands to produce MSGs at maximum capacity in the coming three to four years, and it proposes an operational, easily adjustable methodology to assist MCESG's personnel plans for expansion and future force sustainment. The methodology accounts for uncertainty in the decision-making process by incorporating Monte Carlo simulation techniques. This thesis also provides an easy to use interface built as a visual basic for applications (VBA) userform, meant as a simple and effective tool that can assist planners in standardizing procedures at the operational level. The findings of the thesis indicate that the proposed methodology could yield significant savings in terms of manpower and training requirements for MCESG.

KEYWORDS: marine security guards, demands, analysis, VBA

NAVY ENLISTED RECRUITING: ALTERNATIVES FOR IMPROVING RECRUITER PRODUCTIVITY

Todd C. Winn–Lieutenant Commander, United States Navy
B.S., Metropolitan State College of Denver, June 1996
Master of Science in Management, March 2013
Advisor: Jeremy Arkes, School of Business and Public Policy
Second Reader: Steve Mehay, School of Business and Public Policy

This study examines the productivity of Navy enlisted recruiters and makes recommendations for improving production per recruiter (PPR). Specifically, this research focuses on two areas. First, the study reviews the initial assignment and training process for recruiters. Typically this process, known as the "on-boarding process," takes eight months after initial assignment to basic enlisted recruiter orientation (ENRO). The study evaluates how that process could be shortened by altering when a recruiter reports to initial training. The analysis examines whether it is possible to increase individual productivity with minimal to no increase in cost to the Navy. Second, the study examines the differences in recruiter productivity across Navy enlisted ratings to see whether sailors in some ratings tend to perform better than those in other ratings, in an effort to maximize labor efficiency. The results of the study suggest that some of the ratings that require higher cognitive ability, based on Armed Services Vocational Aptitude Battery (ASVAB) sub-scores, generally perform at a slightly higher level (PPR) than other ratings with lower cognitive ability requirements. Further research is recommended to fully quantify the cost of a rating screening process and understanding the differences in cognitive ability, the different cultures of each rating, and their correlation to recruiting performance.

KEYWORDS: Navy recruiting, manpower/supply, recruiting, distribution, requirements/determination, manpower policy issues, training, skill decay, recruiter development board

FULLY BURDENED COST OF ENERGY ANALYSIS: A MODEL FOR MARINE CORPS SYSTEMS

Richard H. Witt III–Major, United States Marine Corps
B.S., Rochester Institute of Technology, 2002
Christopher E. Larson–Captain, United States Marine Corps
B.A., Fort Lewis College, 2003
Master of Science in Management, March 2013
Advisor: Simona L. Tick, Graduate School of Business and Public Policy
Second Reader: Daniel A. Nussbaum, Graduate School of Operational and Information Sciences

This thesis develops an operational model for estimating the fully burdened cost of energy (FBCEnergy) for the United States Marine Corps (USMC). Marine Corps Systems Command (MARCORSYSCOM) is responsible for the acquisition of ground equipment for the USMC. While USMC ground equipment is primarily dependent on fossil-based fuel, recent shifts in Department of Defense (DoD) acquisitions policy require consideration of all energy consumption, not just fuel.

This thesis uses a stochastic approach and Monte Carlo simulations to develop an operational, easy-to-adjust model for estimating the FBCEnergy for the USMC while considering the commodity cost of fuel; fuel delivery operation and support costs; fuel delivery asset depreciation; direct fuel infrastructure; indirect fuel infrastructure; environmental cost; and other platform unique costs such as force protection or regulatory compliance. The model and main findings of this thesis can be used in any future analysis of alternatives (AoA) performed before the acquisition of new weapon systems.

KEYWORDS: analysis of alternatives, fully burdened cost of fuel, fully burdened cost of energy, assured delivery price, scenario route apportionment, Monte Carlo simulation

THE EFFECT OF EXECUTIVE ORDER 13269 ON NON-CITIZEN ENLISTED ACCESSIONS IN THE U.S. MILITARY

Huseyin Yalcinkaya–Captain, Turkish Army
B.S., Turkish Army Academy, 2003
Melih Can–Captain, Turkish Army
B.S., Turkish Army Academy, 2003
Master of Science in Management, March 2013
Advisor: Jesse Cunha, Graduate School of Business and Public Policy
Co-Advisor: Ryan Sullivan, Defense Resources Management Institute

In this thesis, we analyzed the effect of Executive Order 13269 on non-citizen enlisted accessions to the U.S. military as a whole and to each of the services individually. Data from the Defense Manpower Data Center used in the study covers 1,983,707 enlisted prior and non-prior service accessions from fiscal year (FY) 2000 to FY2010. In order to analyze the policy effect, we aggregated the data to reflect monthly citizen and non-citizen enlisted accessions. An ordinary least squares regression using difference-in-difference estimation was adapted to reveal the effect of the policy.

The results of the regression analysis showed that the decrease in non-citizen accessions was greater than the decrease in citizen accessions after the executive order was implemented. Analyses using service-specific data, except for those of the Coast Guard, support these results.

We conclude that the executive order either had no effect or a negative effect on non-citizen enlisted accessions to the military, and we propose several policy recommendations to improve the effectiveness of the executive order.

The first recommendation is to establish an effective way of recruiting non-citizens by briefing the recruiters in the services about the executive order and its current benefits to the United States and to non-citizens. After looking at news articles to see how Executive Order 13269 was perceived and debated within society, we recommend expanding the efforts to advertise the executive order since most discussion of the order was negative. The benefits provided by the executive order should be broadened to include family members while some requirements might be loosened to attract more non-citizens.

KEYWORDS: noncitizens, immigrants, naturalization, Immigration and Naturalization Act, INA, expedited citizenship, Executive Order 13269, recruiting

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF SCIENCE IN MECHANICAL ENGINEERING

UNIFORM AND MULTI-GRID MODELING OF ACOUSTIC WAVE PROPAGATION WITH CELLULAR AUTOMATON TECHNIQUES

Jermaine A. Bailey–Lieutenant, United States Navy
BSEE, Louisiana State University, December 2004
MSEE, Florida Agricultural & Mechanical University, December 2012
Master of Science in Mechanical Engineering, March 2013
Advisor: Young W. Kwon, Department of Mechanical and Aerospace Engineering
Second Reader: Jarema M. Didoszak, Department of Mechanical and Aerospace Engineering

The cellular automaton (CA) method is an alternative computational technique used in understanding the behavioral response of dynamic systems. It allows great flexibility in the application of various types of boundary conditions. As such, this method was used in developing an alternative propagation model for ocean acoustics. The modeling scheme created a profile of propagation losses versus range, in an acoustic medium. Moreover, the chosen complex boundary conditions, which were not easily modeled by ordinary numerical techniques, were shown to perform with remarkable ease with CA methods.

Accordingly, like any other modeling method, the computational time increases when a refined solution is desired. As such, an alternative multi-grid modeling scheme was shown to increase the performance time of the CA method significantly. This improvement was dependent upon the total number of global grid points inside the multi-grid domain. The end result showed that a multi-grid, with fewer nodal points, produced accurate results that replicated a uniform grid, which utilizes a larger quantity of nodal points.

KEYWORDS: cellular automaton, uniform grid, multi-grid, local grid, underwater acoustics, wave propagation

EXPERIMENTAL AND COMPUTATIONAL FLUID DYNAMIC ANALYSIS OF AXIAL-FLOW HYDRODYNAMIC POWER TURBINE

Grant T. Bryan–Lieutenant, United States Navy
B.S. in Chemistry, U.S. Naval Academy, May 2005
Master of Science in Mechanical Engineering, March 2013
Advisor: Young W. Kwon, Department of Mechanical and Aerospace Engineering
Co-Advisor: Maximilian F. Platzer, Department of Mechanical and Aerospace Engineering

Thorough analysis of drag and power characteristics of hydrodynamic power turbines is necessary for the efficient extraction of energy available at sea. In an effort to obtain these characteristics for a three-bladed, axial-flow hydroturbine used to provide electric power on small sailing vessels, a load cell and voltage measuring system was installed on a carriage in a towing tank for analysis across a speed range of 0.5 to 1.8 m/s. A high-speed camera was used to determine the precise carriage speed and the rotational speed of the turbine rotor. For validation of concept, two thin flat plates were analyzed using the same drag force measuring system in the tow tank to compare experimentally determined drag coefficients with known literature values.

Results are shown for the drag force experienced by the flat plates and both the non-rotating and the rotating turbine configurations. Additional results are shown for the turbine's power generation capabilities at rotational speeds between 90 and 500 RPMs. Using computational fluid dynamics for the rectangular flat plate and non-rotational turbine configuration, the experimental and computational results for the drag force

characteristics were compared.

KEYWORDS: hydropower turbine, hydrodynamic power generations, experimental towing tank analysis of hydroturbine, computational fluid dynamics of 3-bladed rotor for underwater turbine

NOVEL SYNTHESIS AND CHARACTERIZATION OF INORGANIC FULLERENE TYPE WS2 AND GRAPHENE HYBRIDS

Ashley R. Maxson–Lieutenant, United States Navy
B.S., United States Naval Academy, May 2008
Master of Science in Mechanical Engineering, March 2013
Advisor: Claudia C. Luhrs, Department of Mechanical and Aerospace Engineering
Second Reader: Luke N. Brewer, Department of Mechanical and Aerospace Engineering

With the aim to develop personal protection systems with improved mechanical properties and reduced weight, this research combined graphene with tungsten disulfide and studied this hybrid system as an inclusion in epoxy resin.

A novel plasma production process was used to generate nanometric size tungsten oxide (WO3) spherical particles. The nanospheres were then sulfidized to produce inorganic fullerene type tungsten disulfide (IF-WS2). The plasma IF-WS2 particles exhibited smaller particle size, characteristic hollow cores, and larger angle facets than IF-WS2 from commercial WO3. Such morphological characteristics have been correlated with improved mechanical properties. Exfoliated graphene sheets were prepared from graphite powder. Commercial nanometric graphite was subjected to oxidative processes by the use of acids, potassium permanganate and hydrogen peroxide, and exfoliation at high temperatures (800°C) in an inert atmosphere. Sample microstructures were characterized by XRD, SEM, TEM, and FIB.

Protocols to fabricate hybrid graphene/IF-WS2 with dispersions at the nanoscale were developed. Hybrids from in-situ routes and physical mixtures of the individual components were included in epoxy matrices. Nanoindentation tests of the hybrid epoxy composites showed that Young's modulus (normalized for bare epoxy) could be increased up to 12.23% while hardness could be improved up to 27.87% by the use of 1 % wt loadings of graphene/IF-WS2. These results were then compared to carbon nanofibers/IF-WS2 hybrid composites recently produced by other members of the functional materials research group at NPS. This research represents a step ahead in the development of light-weight nano-architectures for the production of advanced personal protection systems.

KEYWORDS: graphene, IF-WS2, epoxy composites, personal protection system

THE ROLE OF STRESS IN THE CORROSION CRACKING OF ALUMINUM ALLOYS

Brian E-S. Scott–Lieutenant, United States Navy
B.S., Virginia Polytechnic Institute and State University, May 2008
Master of Science in Mechanical Engineering, March 2013
Advisor: Luke N. Brewer, Department of Mechanical and Aerospace Engineering
Second Reader: Young W. Kwon, Department of Mechanical and Aerospace Engineering

This work examined the effect of stress on the rate of sensitization, the rate of pitting corrosion, and the rate of crack nucleation of aluminum alloy 5083-H116 aluminum. Stress corrosion cracking in aluminum superstructures of naval vessels is a multibillion-dollar maintenance problem, which requires more scientific understanding to better predict and mitigate. To investigate the role of applied stress on these corrosion-related processes, rolled plate of AA5083 was placed under tensile stress through bending while being subject to elevated temperature and salt spray. Nitric acid mass loss tests quantified the amount of sensitization as a function of stress level. Optical micrographs were used to determine the rate of pitting corrosion and crack nucleation while under applied tensile stress. The effect of applied, elastic stress on the degree of sensitization was inconclusive.

Applied stress did increase the rate of localized corrosion, in terms of both pitting and intergranular corrosion. Moreover, the orientation of the plate with respect to the applied tensile stress strongly affected the type and amount of localized corrosion observed. When the tensile stress was applied across the rolling direction, more localized corrosion occurred and intergranular corrosion was dominant over pitting.

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF SCIENCE IN METEOROLOGY

ATMOSPHERIC RIVERS AND THEIR ROLE IN EXTREME PRECIPITATION IN THE MIDWEST U.S.

Stephanie L. Hedstrom–Captain, United States Air Force
B.S., University of North Dakota, December 2004
Master of Science in Meteorology, March 2013
Advisor: Wendell Nuss, Department of Meteorology
Second Reader: Heather Archambault, Department of Meteorology

Two case studies are presented of atmospheric rivers (ARs) that produced heavy precipitation in the Midwest United States during March 2008 and October 2009. A third case study demonstrating an AR with normal precipitation in the Midwest is also included for comparison. The analyses used the Climate Forecast System Reanalysis (CFSR) data sets for identification of ARs and analysis. The study documents several key ingredients that contribute to differentiating between events of extreme and normal precipitation. The primary findings of this study are as follows: 1) the induced flow due to the low-level/surface temperature anomaly plays an important role in transporting moisture from the Caribbean northward to the Midwest, 2) the induced wind field from a strong upper-level potential vorticity (PV) anomaly increases moisture flux from the Gulf and decreases static stability, which favors convective precipitation, and 3) heavy precipitation events are preceded approximately 9 hours by an increasing, positive moisture flux occurring across the northern Gulf Coast.

KEYWORDS: atmospheric river, heavy precipitation, Midwest U.S.

MESOSCALE SIMULATIONS OF COASTAL CIRCULATIONS EVALUATED USING MEASUREMENTS FROM A DENSE MESO NETWORK

Daniel B. Muggelberg–Captain, United States Air Force
B.S., Florida State University, 2006
Master of Science in Meteorology, March 2013
Advisor: Qing Wang, Department of Meteorology
Second Reader: Wendell Nuss, Department of Meteorology

This research focuses on the evaluation of a mesoscale model in simulating coastal sea-breeze circulations. Measurements for this purpose were made from a mesonetwork consisting of 36 towers and five Doppler wind profilers as part of the Weather Information Network Display System at Cape Canaveral Air Force Station, Florida. The tower measurements provide observations of wind, temperature, and humidity from at least one level on each tower while 17 of the towers have two common levels that allow calculations of surface momentum flux and sensible and latent heat fluxes. For this research, two five-day periods were chosen for analyses and model verification of temporal and spatial variability of sea breeze circulations against high-resolution simulations from the U.S. Navy's Coupled Ocean-Atmosphere Mesoscale Prediction System (COAMPS). In addition to the traditional statistical method of model evaluation, this research also evaluated how the error statistics vary spatially relative to distance from the coastline, an unprecedented approach to studies in this

region. Results from this study suggest general adequacy of COAMPS in simulating the diurnal variation of the sea breeze circulation. However, significant errors resulted in some of the variables such as surface fluxes.

KEYWORDS: land-sea breeze, atmospheric boundary layer, turbulence, momentum flux, heat flux, flux-profile relationship, Monin-Obukhov similarity theory, bulk aerodynamic formulations, mesoscale modeling, COAMPS

AN EVALUATION OF NORTHERN HEMISPHERE MERGED CLOUD ANALYSES FROM THE UNITED STATES AIR FORCE CLOUD DEPICTION FORECASTING SYSTEM II

Chandra M. Pasillas–Captain, United States Air Force
B.S., United States Air Force Academy, June 2004
Master of Science in Meteorology, March 2013
Advisor: Tom Murphree, Department of Meteorology
Second Reader: Tim Nobis, Air Force Weather Agency

Data from the CloudSat cloud profiling radar was used to verify the performance, or operational health, of the United States Air Force's World Wide Merged Cloud Analysis (WWMCA) system to detect clouds. WWMCA performance for 2010 over the Northern Hemisphere was analyzed by (1) cloud event category: cloudy, partly cloudy, clear; (2) geographic region: Northern Hemisphere, 0N–50N, 0N–23.5N, 23.5N–35N, 35N-50N, 50N–90N, South China Sea, and Southwest Asia; 3) month; and (4) age of input data used by WWMCA. Overall and cloud category performance were evaluated using 11 performance metrics. Overall, WWMCA properly identified cloud categories 65% of the time, with a detection range of 40%–70% depending on the region. WWMCA performed best at low latitudes and worst at high latitudes. Decreases in WWMCA accuracy were noted when using input data older than 45 minutes. We confirmed that newer data performed best while older data performed worst, with an improvement of nearly 20% when using all data available rather than data older than three hours. Annual hemispheric average Heidke skill scores were 0.52 for cloudy, 0.47 for clear, and 0.09 for partly cloudy conditions. Maximum HSS values for all three cloud categories occurred at low latitudes while minimum HSS values occurred at high latitudes.

KEYWORDS: WWMCA, CloudSat, cloud verification, meteorology, CDFS II

LONG-RANGE FORECASTING OF SURFACE AIR TEMPERATURE AND PRECIPITATION FOR THE KOREAN PENINSULA

Nicholas J. Reitz–Captain, United States Air Force
B.S., Millersville University, May 2007
Master of Science in Meteorology, March 2013
Co-Advisors: Tom Murphree, Department of Meteorology
David Meyer, Department of Meteorology

We designed, developed, and tested a long-range forecasting system for surface air temperatures and precipitation rates on the Korean Peninsula region at leads of two months for each calendar month. We tested predictors based on: (1) indices of the Arctic Oscillation, El Niño/La Niña, North Atlantic Oscillation, Pacific/North American Pattern, and the West Pacific Pattern; (2) 850 hectopascal geopotential heights and sea surface temperatures in specific regions; (3) persistence; and (4) year (to represent long-term trends).

Our forecasting system included 24 multiple linear regression models, one for temperature and one for precipitation for each month. Each model used a unique set of predictors. We tested each model by conducting 43 years of cross-validated hindcasting for our 1970–2012 study period. The hindcast results showed that overall, the models had skill in predicting above normal, near normal, and below normal temperatures and precipitation rates for the Korean Peninsula (e.g., Heidke skill scores > 0). We used our January models to successfully forecast temperatures and precipitation for January 2013. We also developed a series of forecaster worksheets

to be used for producing forecasts for the Korean Peninsula.

KEYWORDS: Korea, precipitation, precipitation rates, temperature, climate, climate variations, climate anomalies, climate prediction, Arctic Oscillation, El Nino, La Nina, West Pacific Pattern, Pacific/North American Pattern, North Atlantic Oscillation, teleconnection, long-range forecasting, statistical forecast, meteorology

A FURTHER EXAMINATION OF POTENTIAL OBSERVATION NETWORK DESIGN WITH MESOSCALE ENSEMBLE SENSITIVITIES IN COMPLEX TERRAIN

Sean M. Wile–Captain, United States Air Force
B.S., Florida State University, May 2003
Master of Science in Meteorology, March 2013
Advisor: Joshua Hacker, Department of Meteorology
Second Reader: James Doyle, Naval Research Laboratory

Recent expansion in availability of stand-alone atmospheric observing sensors introduces the question of where placement maximizes gain in forecast accuracy. This study examined how sensitivity analysis and observation targeting can be used to optimize sensor placement. The primary objective of this project was to determine whether a mesoscale ensemble sensitivity analysis (ESA) could be used to identify the sensitivity profile of fog formation in a complex terrain environment. Building on work by Chilcoat (2012), this study utilized several alternate methodologies to conduct ESA including a more realistic observing network and implementation of a Gaussian filter. The second objective was to determine whether the calculated sensitivities could be used to reduce forecast uncertainty for a forecast metric related to dense fog formation. This was done by introducing a real-world "truth" observation at the location of greatest sensitivity. The results of this study indicated that ESA provides a cogent mesoscale sensitivity profile that can be used to accurately predict forecast changes in fog using initial condition potential temperature values. This type of information may prove valuable in planning the layout of future observational networks as well as introduce the potential for performing data-thinning during data assimilation and real-time updates to forecast metrics.

KEYWORDS: mesoscale ensemble sensitivity analysis, ensemble sensitivities, mesoscale forecast sensitivities, observation network design, ESA

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF SCIENCE IN METEOROLOGY AND PHYSICAL OCEANOGRAPHY

TIDAL WAVE REFLECTANCE, EVOLUTION AND DISTORTION IN ELKHORN SLOUGH, CA

Casey J. Gon–Lieutenant Commander, United States Navy
B.S., United States Naval Academy, June 2003
Master of Business Administration, May 2009
Master of Science in Meteorology and Physical Oceanography, March 2013
Advisor: Jamie H. MacMahan, Department of Oceanography
Second Reader: Ed B. Thornton, Department of Oceanography

The shoreward and seaward propagating tidal wave components were determined using four co-located pressure and velocity sensors longitudinally deployed in Elkhorn Slough, Monterey Bay, CA, to describe tidal wave evolution and distortion. Elkhorn Slough is a short, reflective (~100%) estuary consisting of a narrow, gently sloping main channel and vast marsh and mud flats near the landward boundary. The amplitude reflection for the astronomical tidal constituent is ~90% whereas the distortion reflection, described by summing all non-astronomical tidal amplitudes, is large (>125%) for all stations showing that the seaward tidal wave is more distorted than the shoreward tidal wave. It was found that the reflective time, defined as the time it takes the tidal wave to propagate to the landward boundary and back, varies as a function of tidal elevation. Surprisingly, the reflective time increased with increasing tidal elevation contrary to the hypothesis that the shallow-water tidal wave phase speed would increase with increasing tidal elevation, resulting in a reduced time. The landward end of the slough has vast low-lying marshes and mud flats that are inundated during higher tidal elevations, causing the effective (average) wave depth to decrease with increasing tide elevation, which explains why the tidal wave phase speed decreased instead of increasing. The elevation-dependent reflective time caused by a time-varying wave phase speed modifies the shape of the seaward tidal wave relative to the shape of the shoreward tidal wave, which explains the evolution and distortion of a tidal wave in a reflective slough.

KEYWORDS: tidal, distortion, evolution, reflection, marsh, wave phase speed, Elkhorn Slough

TEMPORAL AND SPATIAL VARIABILITY OF BLACK SEA HYDRODYNAMICS AND CHLOROPHYLL: A CONCENTRATION WITH CONNECTION TO WIND FORCING

Emre Gulher–Lieutenant Junior Grade, Turkish Navy
B.S., Turkish Naval Academy, June 2006
Master of Science in Meteorology and Physical Oceanography, March 2013
Advisor: Peter C. Chu, Department of Oceanography
Second Reader: Ming-Jer Huang, National Kaohsiung Marine University

Spatial and temporal variability of the Black Sea surface circulation with the link to chlorophyll-a concentration and surface winds was investigated using satellite data from Archiving, Validation, and Interpretation of Satellite Oceanographic data (AVISO), the Sea-viewing Wide Field-of-view Sensor (SeaWiFS), and the Quick Scatterometer (QuikSCAT) with self-organizing maps (SOMs). Six spatial patterns with temporal variability were identified for the surface currents: Pattern-1, Sevastopol Cyclonic and Batumi Dipole Eddies, 21%; Pattern-2, Cyclonic RIM Current and Anti-cyclonic Batumi Eddy, 16%; Pattern-3, Anti-cyclonic Sevastopol and Batumi Eddies, 17%; Pattern-4, Cyclonic RIM Current and Cyclonic Batumi Eddy, 21%; Pattern-5, Anti-cyclonic RIM Current and Batumi Dipole Eddies, 15%; and Pattern-6, Anti-cyclonic RIM Current and Multi

Eddies, 10%. It was found that in the change of the bi-modal characteristics from 2000 to 2009, the fall bloom was more significant than the spring bloom. The surface circulation Pattern-4, cyclonic RIM current and Batumi eddy, is associated with the occurrence of the fall bloom. An evident connection of negative NAO and negative ENSO to the Pattern-4 circulation implies the large-scale atmospheric effect. Possible connection of these patterns to the climatological indices, such as the North Atlantic Oscillation (NAO) and the East Atlantic/West Russian (EAWR), oscillation was also discussed.

KEYWORDS: self-organizing map (SOM), archiving, validation and interpretation of satellite oceanographic data (AVISO), quick scatterometer (QuikSCAT), sea-viewing wide field-of-view sensor (SeaWiFS), North Atlantic Oscillation (NAO), East Atlantic/West Russian (EAWR)

WAVE–CURRENT INTERACTIONS AND WAVE-BLOCKING PREDICTIONS USING THE NHWAVE MODEL

Kaitlyn E. Longley–Lieutenant, United States Navy
B.S., United States Naval Academy, 2004
Master of Science in Meteorology and Physical Oceanography, March 2013
Advisor: Jamie MacMahan, Department of Oceanography
Second Reader: Edward Thornton, Department of Oceanography

Wave-blocking in river inlets was examined using the non-hydrostatic wave (NHWAVE) model under development. Blocking flows at river inlets is a significant hazard to navigation. Refractive and shoaling effects contribute to the enhancement of wave field energy, causing instabilities and breaking, resulting in energy dissipation and transfer at the blocking point. The non-linearity of wave–current interactions and wave breaking makes the dynamics of blocking flows difficult to model. Current efforts to use wave-averaged models were insufficient to describe the complex dynamics that occur within one or two wavelengths of a blocking point. NHWAVE uses the non-hydrostatic, incompressible Navier-Stokes equations to model fully dispersive wave processes in the time domain. Monochromatic wave cases were explored and compared with lab experiments conducted in 2002 at the University of Delaware by A. Chawla and T. J. Kirby to measure energy dissipation due to wave-breaking under conditions of strong opposing currents. The model was initially unable to resolve the boundary conditions necessary to model wave-blocking in a tank domain. However, developments to the numerical scheme in NHWAVE have advanced its capability in this regard. Due to the difficulties of modeling the dynamics of wave-blocking and the boundary conditions in a wave tank, only preliminary results were obtained. NHWAVE needs further development; however, it shows promise in predicting wave reflection, blocking, and dissipation against a strong opposing current.

KEYWORDS: wave-blocking, wave–current interactions, SWASH, NHWAVE

WAVE AND CURRENT OBSERVATIONS IN A TIDAL INLET USING GPS DRIFTER BUOYS

Stephen A. McIntyre–Lieutenant Commander, United States Navy
B.S., Auburn University, December 2002
M.S., University of Southern Mississippi, August 2009
Master of Science in Meteorology and Oceanography, March 2013
Advisor: Thomas H.C. Herbers, Department of Oceanography
Second Reader: Tim T. Janssen, San Francisco State University

The wave resolving drifter (WRD) buoy developed at NPS was refined by adding an accelerometer and utilizing horizontal Doppler velocity measurements to better resolve the wave surface motions. The WRD buoy was validated against a datawell waverider GPS buoy by comparing bulk wave statistics, wave energy spectra, and wave directional spectra. The validation was performed in deep water, off shore of Monterey Bay, CA. Horizontal measurements from Doppler velocities showed improved capability, particularly in the wind–wave

band. Vertical measurements were significantly improved through the addition of the accelerometer. A large array of WRD buoys was deployed in the Golden Gate channel at the entrance to San Francisco Bay and allowed to drift with the outgoing ebb current. The simultaneous deployment of many drifters provided a unique view of the details of the temporal and spatial evolution of the wave field as it propagated through regions of bathymetric and wave–current interactions. As expected, wave heights increased as the wave field propagated over the ebb-tidal shoal and at the entrance to the channel in the presence of a strong opposing ebb current. Inside the channel, strong dissipation of high frequency wind waves was observed in the opposing current.

KEYWORDS: ocean waves, tidal currents, wave buoys, GPS, accelerometer, ebb-tidal shoal, wave–bathymetry interaction, wave–current interaction

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF SCIENCE IN MODELING, VIRTUAL ENVIRONMENTS, AND SIMULATION

ANALYZING NAVAL STRATEGY FOR COUNTER-PIRACY OPERATIONS, USING THE MASSIVE MULTIPLAYER ONLINE WAR GAME LEVERAGING THE INTERNET AND DISCRETE EVENT SIMULATION

Chad R. Hutchins–Lieutenant, United States Navy
B.S., The Citadel, December 2007
Master of Science in Modeling, Virtual Environments, and Simulation (MOVES), March 2013
Advisor: Donald Brutzman, MOVES Institute
Co-Advisor: Arnold Buss, MOVES Institute
Second Reader: Terry Norbraten, MOVES Institute

Combating piracy is an age-old mission for international navies as piracy has troubled ocean-going vessels for centuries. Somali piracy, like all piracy uprisings in the past, is a land-based problem stemming from a dysfunctional government that cannot enforce the laws of the land. This lack of law enforcement is what provides pirates a safe harbor to operate, which allows the problem to trickle into international waters and become a maritime problem. However, in the case of Somali piracy, leaders from the U.S. State Department and the U.S. Navy have said there is too much water in the Indian Ocean for the coalition navies to effectively patrol.

This thesis first demonstrates how the MMOWGLI platform can be used for crowd-sourced brainstorming of strategic options for counter-piracy, yielding valuable action plans that can be modeled, simulated, and analyzed to make strategic decisions. Three highly rated action plans from the 2012 piracy MMOWGLI game were then modeled and simulated using discrete event simulation (DES). Simulation analysis suggests that the amount of ocean is not a factor if coalition navies aggressively patrol the Somali coast, either directly off shore from active pirate camps or by the use of a naval quarantine.

Strategy development for counter-piracy, like any other wicked strategic problem, is usually conducted by senior naval leaders in the upper echelons of specific commands. The MMOWGLI game-play from piracy MMOWGLI and other MMOWGLI games suggests the U.S. Navy needs to consider utilizing a broader range of officers, enlisted personnel, and civilians for brainstorming strategic options. There are an unprecedented number of enlisted sailors with degrees and junior officers educated in joint-professional military education. It is time the military taps into this knowledge base for help in planning and implementing strategy.

KEYWORDS: crowd-sourcing, discrete event simulation (DES), MMOWGLI, Somali piracy, Simkit, Viskit, Java, KML, X3D, X3D-Edit, OpenMap, wicked problems

EFFECTS OF UAV SUPERVISORY CONTROL ON F-18 FORMATION FLIGHT PERFORMANCE IN A SIMULATOR ENVIRONMENT

Eric L. McMullen–Lieutenant Commander, United States Navy
B.S./B.A., Virginia Tech, 1996
Brian S. Grass–Major, United States Army
B.S., Texas Agriculture and Mechanical University, 1995
Master of Science in Modeling, Virtual Environments, and Simulation (MOVES), March 2013
Advisor: Ji-Hyun Yang, MOVES Institute
Co-Advisor: Quinn Kennedy, Department of Operations Research
Second Reader: Joseph Sullivan, Commander, United States Navy, MOVES Institute

Continual advances in technology along with increased cockpit workload—particularly the shift from two-seat to single-seat fighters to save money and reduce risk to life—push the limits of human mental capacity. Additionally, there is interest within the military aviation community to integrate unmanned aerial vehicle (UAV) control into the cockpit in order to expand force projection capabilities.

This study compared the effects on formation flight performance of two different secondary tasks, specifically a traditional secondary task, such as target prosecution with an electro-optical forward looking infra-red (FLIR) pod, and a futuristic secondary task, such as UAV supervisory control. A total of 34 military fighter aviators volunteered to fly three five-minute F-18 simulator sessions in close formation with no secondary task and then with each of the two secondary tasks.

Results provided a clear indication that the futuristic task was significantly more challenging than the traditional task and that both secondary tasks significantly increased the average mean following distance and variance compared to the undistracted flying baseline scenario. Additionally, we found no evidence that increased flight experience (total flight hours) significantly improved performance of the prescribed primary task when treated with the futuristic task distraction. Knowledge gained from the results could contribute to improved crew resource management (CRM), pilot workload management, as well as flight safety, resulting from the modification of flight procedures based on known effects of distractions in the cockpit.

KEYWORDS: simulator, aviation, workload, task prioritization, distraction

MASTER OF SCIENCE IN OPERATIONS RESEARCH

A HIGH EXPLANATORY POWER MODEL OF FOOT AND MOUTH DISEASE SPREAD IN CENTRAL CALIFORNIA

Diwya Alok, Indian Navy
Master of Science, Cochin University, May 2008
Master of Science in Operations Research, March 2013
Advisor: Nedialko B. Dimitrov, Department of Operations Research
Co-Advisor: Dashi Singham, Department of Operations Research
Second Reader: Paul Sanchez, Department of Operations Research

A study conducted by Carpenter, O'Brien, Hagerman and McCarl in 2011 estimated the economic impact of a foot and mouth disease (FMD) epidemic in the United States to be $2.3–$69.0 billion. We simulated an outbreak of FMD across central California using the InterSpread Plus simulation package. We used an experimental design that produced 102,400 epidemic simulation runs. Using the data from the simulations, we identified 16 critical disease and control parameters that have the greatest effect on the spread of FMD. A statistical model based on these 16 parameters and their interactions captures approximately 85% of the variability of the simulation model.

The main takeaways of our analysis of FMD spread were as follows. The two most critical disease parameters were initial condition and local spread. The most critical disease control parameters were market movement and surveillance. Our experimental results indicated that if a typical premise sent an animal to market every 2.2 days instead of every day, we would see a 25% reduction in the mean number of cattle infected. Similarly, if there was less than a three-day delay in between suspecting an FMD outbreak and declaring an FMD outbreak at dairy-like facilities, we would see a 50% reduction in the number of infected cattle. Control measures cannot be taken in isolation. Our models showed significant interaction effects between the most effective control measures—market movement, and surveillance—and other control measures such as tracing, vaccination and depopulation.

KEYWORDS: Central California, foot and mouth disease, disease modeling software, InterSpread Plus, simulation model, design of experiment, NOB, disease parameters, control parameters, regression model, partition tree model, sensitivity analysis

CORRELATION OF READY-FOR-TASKING TO FULL-MISSION-CAPABLE METRICS FOR F/A-18E/F

Bradley A. Brooks–Lieutenant Commander, United States Navy
B.A., North Carolina State University, December 2000
Master of Science in Operations Research, March 2013
Advisor: Lyn Whitaker, Department of Operations Research
Second Reader: Walt DeGrange, United States Navy, Department of Operations Research

Historically, the U.S. Navy has utilized full mission–capable (FMC) as the standard metric in assessing aviation readiness, but an alternative to FMC has been introduced by air wing commanders: ready-for-tasking (RFT). RFT is a less demanding standard for readiness that provides a better representation of mission success

than FMC. Since FMC is used as an input to aviation repairable sparing models, before RFT can replace FMC in funding models, it is necessary to analyze the linkage between RFT and FMC.

This thesis explored the relationship between RFT and FMC based on five years of data from the East Coast Carrier Air Wing's flying F/A-18E/F Super Hornets. Linear and logistic regression models were developed to analyze the impacts 11 common variables had on RFT. It also examined readiness trends throughout the fleet response training plan.

KEYWORDS: RFT, ready-for-tasking, FMC, full mission–capable, F/A-18E/F, Super Hornet, naval aviation, data analysis, regression, logistic regression, multiple regression, readiness, exploratory analysis, FRTP, fleet response training plan

RESOURCE BURDEN OF LOGISTICS TO NAVY SHIPS UNDER THREAT SCENARIOS

Brendon Hathorn–Lieutenant, United States Navy
B.S., Old Dominion University, December 2005
Master of Science in Operations Research, March 2013
Thesis Advisor: Eva Regnier, Defense Resources Management Institute
Second Reader: Dan A. Nussbaum, Department of Operations Research

What is the fully burdened cost of supply to combatant ships in remote locations? Currently, there are directives that require an estimate of the fully burdened cost of energy in a number of analyses in acquisition, but the approved method(s) for estimating this cost are still being developed. Several analyses fail to account for the indirect costs associated with supplying logistics assets. Therefore, we proposed a method for estimating the fully burdened cost of supply in a self-sustaining logistics network in which local infrastructure could not supply logistics assets. This thesis developed this method for the U.S. Navy by building a model of Navy supply transport and using it to estimate the total resource requirement of supply at various points in the network and to explore how that cost changes as a function of the force protection required for the logistics vessels.

KEYWORDS: fully burdened cost of energy, naval logistics, acquisition, convoy, escorts

ASSESSING THE IMPACT OF CONGESTION DURING A MULTI-COUNTY EVACUATION

April E. Malveo–Lieutenant Commander, United States Navy
B.S., Louisiana Tech University, 2000
Master of Science in Operations Research, March 2013
Advisor: Emily M. Craparo, Department of Operations Research
Second Reader: David L. Alderson, Department of Operations Research

This thesis introduces an integer linear program called a minimum cost flow with congestion assignment (MCF-CA) model. MCF-CA is a multi-period evacuation model that uses a novel approach called congestion assignment to analyze clearing times during mass evacuations. Congestion assignment discretizes the nonlinear relationship between the number of vehicles on a road segment and the maximum speed at which those vehicles can travel. MCF-CA selects among three congestion levels (none, moderate, and high) for each road segment in each epoch. Depending on the congestion level selected, MCF-CA limits the number of vehicles that are able to traverse the road segment and uses Akçelik's time-dependent speed-flow function (Akçelik 2003) to determine the average travel speed of the vehicles for that period. As a result, we were able to determine approximate evacuation clearing times under nonlinear congestion effects by solving an integer linear program. We limited residents' prior knowledge of traffic conditions by implementing MCF-CA in a rolling horizon fashion and studied the impact of this limited knowledge on evacuation patterns. We also modeled the impact of sub-optimal routing decisions on residents by artificially shifting residents toward their own shortest paths rather than a "socially optimal" route.

We found that a mass evacuation could more than double the clearing times of individual county evacu-

ations. However, during both county and mass evacuations, resident routing choices significantly impacted clearing times. As more residents chose suboptimal routes, clearing times were prolonged. Lastly, we found that more than 50% of residents would experience congestion at some point during the evacuation horizon. However, allowing some congestion improved evacuation clearing times by 20–36% over not congesting. Although congestion decreased vehicle travel speed by 70–80%, over 50% more residents were able to start or continue evacuating during each epoch.

KEYWORDS: congestion, mass evacuation, Akçelik, route choice, rolling horizon, minimum cost flow, network, capacity, multi-region, socially optimal, evacuation patterns, clearing time, GAMS, integer linear program, congestion assignment

OPTIMIZING TRANSPORTATION OF DISASTER RELIEF MATERIAL TO SUPPORT U.S. PACIFIC COMMAND FOREIGN HUMANITARIAN ASSISTANCE OPERATIONS

Phillip Mogilevsky–Lieutenant Commander, United States Navy
B.A., University of Albany, 1997
Master of Science in Operations Research, March 2013
Advisor: W. Matthew Carlyle, Department of Operations Research
Second Reader: Walter DeGrange, United States Navy, Department of Operations Research

In the wake of a global natural disaster, the U.S. military often plays a significant logistical role at the request of the Department of State in overall relief efforts. Its primary purposes in these support missions are to safeguard lives, alleviate human suffering, and mitigate property damage. Our military has robust capabilities in transportation and security, and readily available stockpiles of life-saving humanitarian assistance and disaster relief material. Disaster relief operations are time-critical because delays in the delivery of aid can cause increased suffering and perhaps death. This thesis optimizes the transportation of humanitarian assistance and disaster relief material to the affected state within the U.S. Pacific Command's area of responsibility. Optimization of this transportation network results in significant reductions in planning times, development and analysis of several alternative courses of action, and savings in delivery times and/or costs. A cost-versus-time analysis of alternatives provides decision-makers more flexibility than they previously had.

KEYWORDS: logistics, disaster relief, foreign humanitarian assistance, transportation, networks, optimization

ANALYSIS OF NONDETERMINISTIC SEARCH PATTERNS FOR MINIMIZATION OF UAV COUNTER-TARGETING

Timothy S. Stevens–Lieutenant, United States Navy
B.S., University of Arizona, May 2005
Master of Science in Operations Research, March 2013
Advisor: Timothy Chung, Department of Systems Engineering
Second Reader: Michael Atkinson, Department of Operations Research

Unmanned aerial vehicles (UAVs) have become a mainstay of modern-day military operations such as surveillance and reconnaissance missions. Adversaries of the United States are fully aware of this shift and are developing weapons and training to counter these unmanned assets. Many of the counter-UAV weapons under development and testing require that a target lock be maintained on the UAV for some minimum amount of time. By randomizing the flight pattern, e.g., when conducting ISR missions, and limiting the time the UAV travels on any single flight leg, we can minimize the vulnerability of these assets. To accomplish this randomization, we employed a Levy distribution function to determine the length of each search leg while changes in searcher heading were drawn from a uniform distribution. We modeled realistic flight limitations using Dubins curves, which define the minimum distance path between two points of different heading orientation

given the minimum turn radius capability of the searcher. Regression analysis of simulated search times was used to derive the expected coverage rate. We defined a metric, the probability of mission success, comprised of a time to target detection by the searcher and a time to counter-targeting of the searcher by the adversary. A Bayesian update scheme was applied to the search to incorporate imperfections in sensor performance, along with a looping search function. If no target detection occured within a specified amount of time, the searcher's travel was biased toward the area of highest target probability density. The culmination of this thesis was the development of a simulation model for analysis on the employment of nondeterministic search patterns as a means to mitigate counter-targeting and counterdetection threats.

KEYWORDS: nondeterministic, search theory, Dubins curves, Bayesian probability update, unmanned, random flight pattern

MASTER OF SCIENCE
IN
PHYSICAL OCEANOGRAPHY

NUMERICAL MODELING OF THE VERTICAL HEAT TRANSPORT THROUGH THE DIFFUSIVE LAYER OF THE ARCTIC OCEAN

Angela S. Lefler–Lieutenant Commander, United States Navy
B.S., Texas A&M University, May 2003
Master of Science in Oceanography, March 2013
Advisor: Timour Radko, Department of Oceanography
Second Reader: Jason Flanagan, Postdoctoral Associate, National Research Council

The Arctic Ocean has been a subject of increasing interest in recent years due to the reduction of the sea-ice thickness and spatial coverage and their implications for climate change. The future state of the Arctic is likely linked to vertical heat transport by microscale processes, specifically double-diffusive convection. A series of realistic three-dimensional direct numerical simulations (DNSes) were conducted to assess the vertical heat transport through thermohaline staircases in the Arctic region. Results revealed that vertical fluxes exceeded those of extant "four-thirds flux laws" by as much as a factor of two and suggested that the 4/3 exponent requires downward revision. Results also showed that a two-dimensional DNS can provide an accurate approximation of heat fluxes when the density ratio is sufficiently large. DNS results also revealed that the models with rigid boundaries result in heat flux estimates that are lower than those from models with periodic boundary conditions. Finally, the DNS-derived flux law was applied to Arctic data and results supported the conclusion that lab-derived flux laws significantly underestimate heat flux. All of these results suggest that vertical heat transport due to double-diffusive convection is a significant contributor to the measured reduction of Arctic sea-ice.

KEYWORDS: Arctic Ocean, double-diffusion, diffusive convection, flux law, numerical simulations, vertical heat flux, thermohaline staircase

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF SCIENCE IN PROGRAM MANAGEMENT

CONDUCTING A COMPETITIVE PROTOTYPE ACQUISITION PROGRAM: AN ACCOUNT OF THE JOINT LIGHT TACTICAL VEHICLE TECHNOLOGY DEVELOPMENT PHASE

Joel M. Grgurich–Civilian, Department of the Army
B.S., Iowa State University, May 1983
Master of Science in Program Management, March 2013
Lead Advisor: David Dopp, Civilian, Department of the Army
Advisor: Michael W. Boudreau, Graduate School of Business and Public Policy

The joint light tactical vehicle (JLTV) was among the first defense programs to require a competitive prototyping acquisition strategy under the September 19, 2007, USD (AT&L) policy memorandum "Prototyping and Competition." At Milestone A, the program was directed to inform the requirements process, validate technology maturity, assess commonality of components across a family of vehicles, and assess manufacturing risks. As a result, the joint program office simultaneously executed prototyping contracts for three weapons systems in a continuously competitive environment while meeting cost, schedule, and performance objectives. The goal of the JAP was to describe the program management strategy used in the JLTV technology development (TD) phase. The resulting document is a firsthand perspective from working within the product manager (PM). It discusses how objectives of the TD acquisition phase program were addressed as well as provides several unique management solutions. The focus is an account of planning and managing three contracts from September 2008 to May 2010. Information from the JLTV TD phase has significantly changed the requirements for the EMD phase. In addition to informing requirements, the program leveraged the competitive environment by maintaining constant emphasis on the contractors to meet cost and schedule. The results demonstrated that competitive prototyping can work.

Keywords: JLTV, joint light tactical vehicle, competitive prototyping, technology development phase

THE ELECTROMAGNETIC IMPACT OF WIND TURBINES

Gregory Sasarita, GS-13, U.S. Army Electronic Proving Ground
Charles R. Wright, GS-13, U.S. Army Missile Command
Master of Program Management, March 2013
Lead Advisor: David F. Matthews, Graduate School of Business and Public Policy
Support Advisor: Joseph T. Schulte, Chief, Joint Interoperability Test Command

The objective of this project was to investigate the impact that a wind turbine can have on the electromagnetic environment that affects communication systems. The power generation process in a wind turbine has the potential to create radio frequency (RF) emissions, and the tower/blades can reflect RF signals, which can negatively impact RF communication systems. This project involved measuring the RF environment before and after the wind turbine was constructed. RF signals between 2 MHz and 18 GHz were transmitted towards the location of the wind turbine using directional antennas while taking receive-signal-level (RSL) measurements at different distances from the turbine. This was done after the wind turbine was fully operational. The effects of the wind turbine on the RF environment were based on measurements taken before and after the turbine was constructed. Methods to mitigate effects encountered were explored. The effects that wind turbines have

on the electromagnetic environment and referenced communication systems were documented in detail, along with suggestions on how to mitigate the effects.

KEYWORDS: wind turbine, renewable energy, RF emissions, interference

MASTER OF SCIENCE
IN
REMOTE SENSING INTELLIGENCE

VISIBLE NEAR-INFRARED AND SHORTWAVE INFRARED SPECTRAL VARIABILITY OF URBAN MATERIALS

Kenneth G. Fairbarn Jr.–Civilian, Department of the Navy
B.A., University of California Santa Barbara, June 2009
Master of Science in Remote Sensing Intelligence, March 2013
Advisor: Fred A. Kruse, Remote Sensing Center
Second Reader: R.C. Olsen, Remote Sensing Center

The advent of relatively high spatial resolution hyperspectral imagery (HSI) provides a different perspective of the urban environment than lower spatial resolution hyperspectral data and either multispectral or panchromatic images. The objective of this thesis was to build and analyze a spectral library of urban materials and to understand how spectral variability affects the ability of classification algorithms to identify and discriminate various materials. The scope of the project was limited to non-vegetative impervious materials located on the Naval Postgraduate School campus. An airborne hyperspectral image, acquired September 30, 2011, was used for image-derived endmembers, and a portable spectroradiometer was used to collect field spectra. Visual analysis of spectra was performed to assess intra- and inter-class variability and to identify spectral features and their causes. The spectral angle mapper (SAM) algorithm was used on the HSI data as a method to quantify intra-class spectral variability using a standard spectral angle. Classification maps were created with both SAM and mixture-tuned matched filtering (MTMF) algorithms to determine how intra- and inter-class spectral variability affect the algorithm's ability to classify urban materials. The spatially complex nature of the urban environment negatively affected the performance of the SAM algorithm, but the ability to increase the spectral angle to account for materials with high spectral variability allowed improved inter-class discrimination. The MTMF algorithm was better suited for intra-class discrimination of materials.

KEYWORDS: remote sensing, hyperspectral, spectrometry

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

MASTER OF SCIENCE IN SPACE SYSTEMS OPERATIONS

SATELLITE CONSTELLATION OPTIMIZATION FOR TURKISH ARMED FORCES

Huseyin Kiremitci–Captain, Turkish Air Force
B.S., Turkish Air Force Academy, June 2000
Master of Science in Space Systems Operations, March 2013
Advisor: J. Scott Matey, Lieutenant Colonel, United States Army, Space Systems Academic Group
Second Reader: Alan Scott, Space Systems Academic Group

Advancing technologies in smallsats provide remote sensing and communications capabilities achievable with a constellation of satellites at a reasonable cost to meet military needs. Like any other nation looking for a cheap but effective solution in that area, Turkey might also benefit from a replacement of its remote sensing assets. Currently, Turkish Armed Forces rely on a limited number of reconnaissance aircraft and unmanned aerial vehicles, which do not provide real-time or near real-time remote sensing capabilities. The near real-time remote sensing needs for the Turkish warfighter dictate that the Turkish Armed Forces reach that capability as soon as possible. Likewise, replacing conventional communication radios with satellite communication devices would also fulfill warfighter needs. While current communication devices have physical limitations in Turkey's mountainous terrain and the surrounding seas, a satellite communication capability would provide wider coverage and might, for specific frequencies, provide better resistance to jamming and interference, too. For the benefit of Turkish Armed Forces communications, a satellite constellation should be optimized such that effective coverage will be achieved with the least number of satellites to provide a reasonable cost. In this study, satellite constellation optimization for the Turkish Armed Forces was achieved using the Systems Tool Kit software from Analytical Graphics, Inc. to simulate and analyze several possible communications and remote sensing satellite constellations covering Turkish territory and surrounding seas.

KEYWORDS: constellation optimization, small satellites, satellite coverage, Systems Tool Kit software (STK), Walker–Delta, Turkish armed forces

OPERATIONAL ANALYSIS OF TIME-OPTIMAL MANEUVERING FOR IMAGING SPACECRAFT

Wenjie Yeau–Civilian, Defence Science Technology Agency, Singapore
B.Eng., National University of Singapore, June 2006
M.S. in Management of Technology, National University of Singapore, June 2010
Master of Science in Space Systems Operations, March 2013
Co-Advisor: Mark Karpenko, Department of Mechanical and Aerospace Engineering
Co-Advisor: I. Michael Ross, Department of Mechanical and Aerospace Engineering

There is currently a gap in translating the performance enhancements made possible by new maneuver strategies into operational benefits derived for spacecraft missions. In the context of imaging satellites, slew time is one of the key factors that influences the economic performance of image collection operations. To analyze the operational benefits associated with adopting time-optimal maneuver strategies to reduce slew times, this thesis studied two different operational scenarios based on the Singapore-developed X-SAT imaging spacecraft. The analysis was facilitated through the use of AGI's Systems Tool Kit (STK) software. An analytic hierarchy process (AHP)–based framework was proposed to evaluate, from a business analytic point of view, the impact of incorporating time-optimal maneuvers as part of X-SAT imaging operations. The business case

analysis was focused on assessing key performance indicators such as image collection volume, collected image resolution, and economic revenue. The findings presented herein suggest that time-optimal maneuvers can enhance the value of imaging operations and provide additional revenue for satellite operators. Moreover, the proposed AHP hierarchy model was found to provide a convenient and methodical means for quantifying the operational advantages and economic return on investment (ROI) that can be obtained when incorporating new maneuver strategies into spacecraft operations.

KEYWORDS: operational analysis, time-optimal maneuvers, spacecraft, business case analysis, imaging satellites, analytic hierarchy process

MASTER OF SCIENCE IN SYSTEMS ENGINEERING

The following capstone project reports were produced by cohorts of residential or distance learning students in the systems-engineering curriculum. The degrees awarded include Masters of Science in Systems Engineering, Systems Engineering Management, and Engineering Systems.

INTEGRATION OF MULTIPLE UNMANNED SYSTEMS IN AN URBAN SEARCH AND RESCUE ENVIRONMENT

Boon Heng Chua–Defence Science and Technology Agency, Singapore
B.Eng., Nanyang Technological University, Singapore, June 2007
Master of Science in Systems Engineering, March 2013
Advisor: Oleg Yakimenko, Departments of Mechanical Engineering and Systems Engineering
Second Reader: Mark Stevens, Department of Systems Engineering

In view of the local, regional, and global security trends over the past decade, the threats of disaster to the populace inhabiting urbanized areas are real, and there is a need for increased vigilance. There can be multiple causes for urban disaster: natural disasters, terrorist attacks, and urban warfare are all viable. This thesis focused on an event in which urban search and rescue operations is required due to the aftermath of terrorist activity. Systems engineering techniques were utilized to analyze the problem space and to suggest a plausible solution. Application of unmanned vehicles in the scenario enhanced the intelligence, surveillance, and reconnaissance capabilities of the responding forces while limiting the exposure risk of personnel.

One of the many challenges facing unmanned systems in a cluttered environment is the capability to rapidly generate reactive obstacle avoidance trajectories. A direct method of calculus of variations was applied for the unmanned platforms to collaboratively achieve mission objectives and to perform real-time trajectory optimization for a collision-free flight. Dynamic models were created to enable simulated operations within the thesis design scenario. Experiments conducted in an indoor lab verified the unmanned systems' ability to avoid obstacles and carry out collaborative missions successfully.

KEYWORDS: quadrotor, UAV, direct method, urban environment, urban search and rescue, trajectory optimization, inverse dynamics, IDVD

MATURITY ASSESSMENT OF SPACE PLUG-AND-PLAY ARCHITECTURE

Cheth Ouch–Captain, United States Air Force
B.S., University of Washington, April 2000
Master of Science in Systems Engineering Management, March 2013
Co-Advisor: Thomas V. Huynh, Department of Systems Engineering
Co-Advisor: James C. Lyke, Air Force Research Laboratory

Space plug-and-play architecture (SPA), as defined by SPA subject-matter experts, is "a spacecraft development architecture that includes technology and standards developed to facilitate simplified design, assembly, and test of spacecraft systems using modular components to reduce spacecraft development cost and schedule." There has been a need to assess the maturity of SPA to determine its benefits and return on investment. However, SPA, as both a system and a combination of technology and standards, poses challenges for the maturity assessment. In this thesis, the author presents methodologies to assess the maturity of SPA using the existing

technology readiness level (TRL) process and developing a new process for the standards. The TRL process was applied to the technology components and the SPA system. The proposed process for assessing the maturity of the product development standards was similar to the TRL process but tailored for applicability to standards. The methodology for assessing the maturity of SPA standards was based on the premises of "what was done and under what conditions." Applying these methodologies to assess the maturity of SPA gave a complete picture of the status of its development, which was used to estimate the cost to reach full maturity with more accuracy.

KEYWORDS: space plug-and-play avionics, space plug-and-play architecture, maturity assessment, technology readiness assessment, technology readiness level, standards maturity assessment, maturity assessment of architecture, system maturity assessment

HAWAII ALGAL BIOFUEL

Cohort 311-113A, Team HNAABS
Charles Allen, Mohamad Gabriel Bowden Affandy, Donald Bridges, Jesse Black, Scott Brown, John W. Clark, Quinn Daniels, Valerie Dobrowolski, Jessica Jeffries, Todd Janer, Drew M. Janicek, Jeffrey M Johnson, Julia Martin, Jonathan McGovern, Matthew Morris, Edward Poling, Megan Praschak, Michael Rogers, Jordan Schmalz, Christopher Soques, and David Thomas
Master of Science in Systems Engineering, March 2013
LCDR Joseph Kamara, Kevin Broadnax, Karolyn Campbell, Edwin Racelis, and Mark P. Relova
Master of Science in Engineering Systems, March 2013
Advisor: David H Olwell, Department of Systems Engineering
Second Reader: Joseph W Sweeney, Department of Systems Engineering

This report investigated the feasibility and affordability of producing algae-derived biofuel in Hawaii for military aviation. The authors evaluated methods for cultivating algae, investigated the processes necessary to locally refine bio-oil into bio-kerosene, researched the environmental impacts of cultivation and refinement facilities in Hawaii, and studied the resultant cost-per-gallon of bio-kerosene production. Based on the current state of technology and the proposed system of systems architecture, this report estimated that bio-kerosene could be produced for $8.00-22.87/gal, indicating that although this system was technically feasible, is was unaffordable at current fuel prices without ongoing subsidies or further technical innovation.

KEYWORDS: biofuel, algal oil, green crude, bio-kerosene, Hawaii, energy security, naval aviation fuel

INCREASING FLEET READINESS THROUGH IMPROVED DISTANCE SUPPORT

Cohort 311-1130, Distance Support Team
Briza Alatorre, Jason Bickford, Richard Cruise, Stacie Jue, Masato Taniguchi, Felipe Tolentino, Hai Tonthat, and Jack White
Master of Science in Systems Engineering, March 2013
Master of Science in Engineering Systems, March 2013
Advisor: Mark Rhoades, Department of Systems Engineering
Advisor: Brigitte Kwinn, Department of Systems Engineering

The Navy has developed distance support tools for specific naval systems. These tools often do not facilitate knowledge retention and reutilization; to resolve this problem, a data aggregation system (DAS) was recommended to aggregate and integrate data to improve fleet readiness. A systems engineering (SE) process derived from the 2009 Department of Defense (DOD) SE Model was used to develop the DAS. Based on past Navy-led distance support studies and completed surveys, the team determined that the stakeholders need a data aggregation system that provides 1) easily accessible data, 2) high quality information, 3) current data, 4) well

organized information, and 5) information reported on demand. The team conducted a requirements analysis to trace and prioritize the system requirements based on stakeholder needs. The requirements were then mapped to functions. The high level system functions identified were to 1) obtain data, 2) process data, 3) analyze data, 4) report data, and 5) display data. An analysis of alternatives (AoA) using gap analysis yielded two feasible solutions: 1) to modify the Engineering and Supportability Decision System (ESDS) or 2) to develop a new system. The results of cost and risk recommended a modified ESDS solution. The solution architecture was documented using Vitech's CORE software suite.

KEYWORDS: distance support, fleet readiness, data aggregation, systems engineering, architecture, gap analysis

ALGAE-BASED BIOFUEL DISTRIBUTION SYSTEM TO SERVICE THE DEPARTMENT OF DEFENSE IN HAWAII

Cohort 311-1130, Team Biofuels
LT Kristen Kerns, Jonathan Hopkins, Judith Young, Kevin Neaves, Patrick Knowles, Joseph Villucci, and Michael Lisella
Master of Science in Systems Engineering, March 2013
LCDR David Featherby, LT John Lester, Roge Adveralo, Larry Coleman, and Richard Seriani
Master of Science in Engineering Systems, March 2013
Advisor: Brigitte T. Kwinn, Department of Systems Engineering
Advisor: Mark M. Rhoades, Department of Systems Engineering

The most effective distribution system, capable of delivering 42.9 million gallons of biofuel annually to the Department of Defense aviation assets in the state of Hawaii, consists of a combination of pipeline and trucks. A tailored systems engineering process using an analytical hierarchy process assessed stakeholders' requirements with quantifiable metrics and used CORE to develop a functional architecture to trace these needs. The modeling software ExtendSim was used to simulate various alternatives of a distribution system comprised of pipeline and/or trucks to deliver a required capacity of a pre-mixed biofuel blend. Environmental risks of the system were assessed, and a master logic diagram was used to identify ways to manage risk. Based on this analysis, the capabilities and benefits of this combination system outweigh the potential risks associated with its operation. An analysis of alternatives confirmed that in terms of performance and cost, the most efficient distribution system takes place in two stages. First is the transportation of biofuel from the refinery to the Red Hill Storage Facility via the pipeline currently in place. From this point, trucks load the biofuel at the pumping station to continue delivery to the customers.

KEYWORDS: systems engineering, biofuel distribution, AHP, functional architecture

MITIGATING COST AND SCHEDULE RISK FROM ENVIRONMENTAL LITIGATION OVER DOD PROJECTS IN HAWAII

Michael R. Stefani, Naval Surface Warfare Center, Crane Detachment, Fallbrook, CA
B.S., California Polytechnic State University, San Luis Obispo, 2001
Master of Science in Systems Engineering Management, March 2013
Advisor: David H. Olwell, Department of Systems Engineering
Second Reader: Joseph W. Sweeney III, Department of Systems Engineering

The National Environmental Policy Act of 1969, coupled with advances in communication technology, have brought the general public into the decision-making process for environmental reviews required to make federally funded infrastructure project decisions. This public participation is well pronounced in the state of Hawaii with its strong environmental, historical, and cultural ties. This public involvement, along with the often variable analysis and communication requirements, has the potential to add significant cost and schedule

risk to ongoing and future infrastructure development projects. This thesis evaluates past project challenges and provides common themes and lessons learned to reduce the likelihood of repeating these failures. It is envisioned that the Department of Defense will be able to use this information to reduce cost and schedule risk for future infrastructure projects in the state of Hawaii.

KEYWORDS: environmental impact statement, environmental assessment, National Environmental Policy Act, Hawaii Environmental Policy Act, infrastructure project, Hawaiian Islands

TERRORISM IN THE MARITIME DOMAIN

Eng Hock Tng–Civilian, Defence Science and Technology Agency, Singapore
B.Eng., National University of Singapore, June 2006
Master of Science in Systems Engineering, March 2013
Advisor: Gary O. Langford, Department of Systems Engineering
Second Reader: John Osmundson, Department of Information Science

The impact of the September 11, 2001, attack by Al Qaeda was felt worldwide with increased security measures. However, maritime security measures are not as encompassing. This thesis investigated the possibility of maritime domain terrorism threats and what could be done to prevent such attacks as modeled on the basis of system of systems. Only certain terrorist groups have the capability to launch maritime terrorist attacks. The terrorist motives are to spread their political message, responding to what they have perceived as oppression. The system of systems model suggests (and is validated) that container vessels and cruise ships are potential targets, with possible human and economic consequences. However, these maritime targets fail to match the terrorist groups' objectives. Political assets, such as warships and land-based maritime infrastructure, align well with terrorist motives. Enhanced security measures to protect military and maritime infrastructure may require terrorists to use uncommon forms of attack. Terrorists could use submersible vehicles to remain undetectable. Costly submersible vehicles limit the type and number of terrorist groups that can employ such a capability.

KEYWORDS: terrorism, human systems

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

NPS
PRAESTANTIA PER SCIENTIAM
1 9 0 9

J

K

L

M

N

O

P

R

HOW TO OBTAIN FULL TEXT OF THESES

NPS's Dudley Knox Library catalogs all publicly releasable theses, technical reports, and MBA professional reports. Therefore, a good source of information about all NPS faculty and student publications is the library's general catalog, BOSUN, accessible at http://www.nps.edu/Library/index.html. An explanatory page facilitating access to theses and other NPS-produced reports can be found at http://calhoun.nps.edu. A list of technical reports can be found at http://www.nps.edu/Research/TechReports.html.

Copies of unclassified theses or other reports that are publicly releasable may be purchased from either of the following agencies, depending on circumstances. Government employees or individuals affiliated with research and development activities within the federal government or its associated contractors, subcontractors, or grantees under current U.S. government contract can order from the following:

DEFENSE TECHNICAL INFORMATION CENTER (DTIC)
8725 John J. Kingman Road
Fort Belvoir, Virginia 22060-6218
Phone: (703) 767-8274; DSN 427-8274 Option 1
Email: ref@dtic.mil
URL: http://www.dtic.mil/dtic/

Purchasing documents from DTIC requires online registration. However, many theses, particularly those completed recently, are available in electronic format for free at http://stinet.dtic.mil.

Private U.S. citizens without a U.S. government contract can purchase copies from the following:

NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)
5301 Shawnee Road
Alexandria, Virginia 22312
Phone: 1-800-553-6847 or (703) 605-6000
Email: orders@ntis.gov
URL: http://www.ntis.gov/help/ordermethods.aspx

For those outside of the U.S., Canada, or Mexico, please see the NTIS arrangements with international cooperating organizations at http://www.ntis.gov/help/cooperate.aspx.

NTIS requires the following information to obtain a document: 1) author, 2) title, 3) publication date, and 4) reference to the document as a Naval Postgraduate School thesis. General inquiries concerning faculty and student research at the Naval Postgraduate School may be addressed to research@nps.edu.